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HUMIDITY AND HEAT-STROKE.[1]

BY COLONEL R. J. S. SIMPSON, C.M.G.

"IT is clear that in still and warm air, what matters to the person present is neither the temperature of the air, nor its relative saturation, nor the absolute percentage of aqueous vapour present, but the temperature shown by the wet bulb thermometer" (Haldane, *Journal of Hygiene*, vol. v, p. 494).

This important statement is supported by the results of numerous experiments, and is undoubtedly valid within the limits of these experiments. It may be useful to inquire how far these results are comparable with the actual conditions in tropical climates.

(1) One may first consider what temperature really means. What we call in practice the temperature of a body is the excess as shown by the expansion of mercury in a thermometer over its volume at an arbitrary point or zero; here we read, not an absolute value but a measure of the increment above a certain zero value. This increment of temperature depends on the excess of heat received by the body (Q) over that lost by radiation from the body (q), and on the specific heat of the body under observation; or in symbols, if t is the temperature and c the specific heat, $t = c\,(Q - q)$.

[1] This should be read in connexion with Dr. Pembrey's article on "Heat-stroke" in the last number of the Journal.

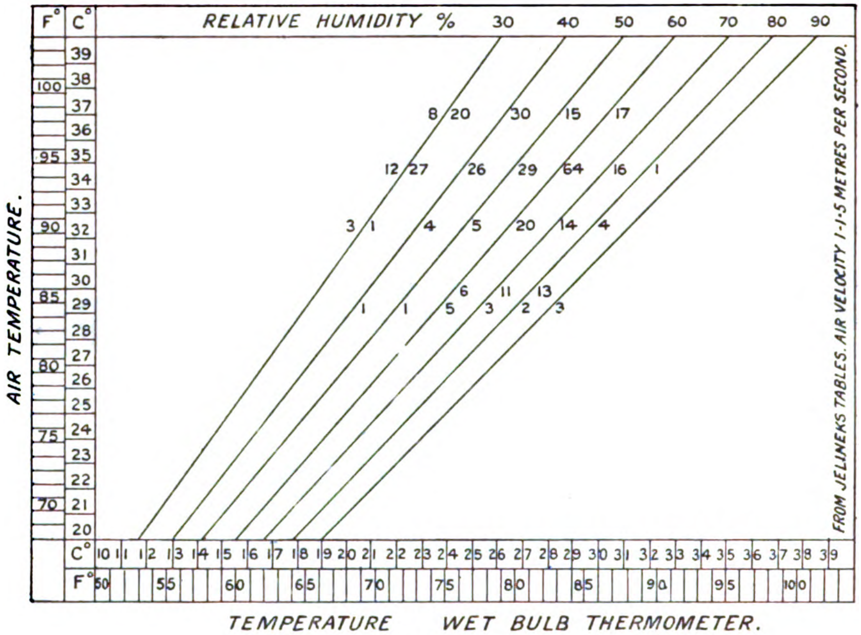
F°
C°
RELATIVE HUMIDITY %
30
40
50
60
70
80
90
AIR TEMPERATURE.
TEMPERATURE WET BULB THERMOMETER.
FROM JELINEKS TABLES. AIR VELOCITY 1-1·5 METRES PER SECOND.

FIG. 1

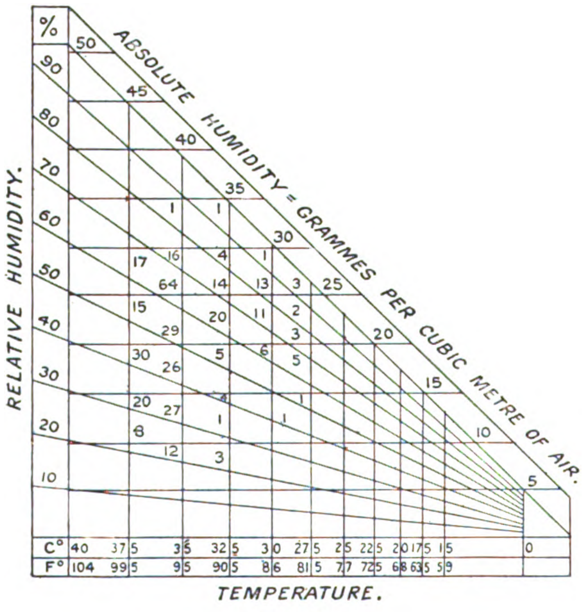
%
ABSOLUTE HUMIDITY = GRAMMES PER CUBIC METRE OF AIR.
RELATIVE HUMIDITY.
C°
F°
TEMPERATURE.

FIG. 2.

The amount of heat lost (q) depends on the rate of cooling, which is approximately (according to Newton's law) dependent on the difference of the temperatures of the body and the surrounding medium, multiplied by a coefficient varying with the nature of the surface of the body. Or if T is the temperature of the body, T′ that of its surroundings, and k the coefficient, q, the heat lost depends on k (T—T′). Obviously the body gets warmer, remains at the same temperature, or cools according as T′ is greater than, equal to, or less, than T.

When the surface of the body is moist, in addition to the heat lost by radiation, there is a more important loss by evaporation. In the case of the wet bulb thermometer, for instance, the total loss of heat is made up of the excess of the heat lost by radiation over that received, and the quantity used up in the process of evaporation from its damp covering, or if t' is the temperature shown by the wet bulb and q' the heat lost by evaporation, $t' = c\,(Q-(q+q'))$. It is evident that if the *difference* between the total quantity of heat received and the total quantity lost is the same, the temperature shown by the wet bulb will remain constant irrespective of the actual quantities of heat received and lost. That is to say, with the same wet bulb temperature, we may have a relatively high air temperature with rapid evaporation, or a relatively low air temperature with slow evaporation. So that a constant wet bulb temperature does not define a constant condition, but one where the rate of evaporation varies as well as the air temperature.

It is obvious that external temperature has a most important influence in regard to the maintenance of a constant body temperature; the less the difference between the air temperature and that of the body, the greater must be the loss of heat from the body in order to maintain its temperature constant. For this purpose the most efficient agent is evaporation.

(2) *Evaporation.*—Assuming a constant surface area, the rate of evaporation is determined by three factors, the temperature, the amount of water vapour present in the surrounding air, and the rate at which the saturated layer of air in contact with the water is renewed, i.e., the amount of ventilation. Taking these in order:—

(*a*) Temperature.—With a constant pressure of water vapour in the surrounding air, the rate is proportional to the temperature.

(*b*) The Amount of Water Vapour in the Air.—At any temperature air can only take up a certain amount of water vapour by which it is saturated. This amount may be expressed in pressure

units (inches or millimetres) or in units of weight per standard volume (troy grains per cubic foot, or grammes per cubic metre). When, at any temperature, air is saturated, any fall in temperature results in the condensation of part of the water vapour, which is evaporated again when the temperature regains its original level. Hence at saturation pressure or weight, condensation is completely compensated by evaporation.

The total evaporation can, of course, be measured directly by the total loss from a known weight of water covering a known area during a known time, which in practice must be comparatively long. Here the varying rates of evaporation during the period are integrated. We can also measure the rate of evaporation (by the combination of a wet and dry bulb thermometer, or psychrometer) indirectly through the fall of temperature in a few minutes. From the three elements obtained from the reading of the psychrometer, the two temperatures and their difference, we ascertain the vapour pressure, and hence the weight of water in the standard volume of air at the time of observation, and can compare them with the saturation pressure or volume at the air temperature, and so obtain the relative humidity at the time of observation. There are several reduction formulæ, of which that generally used is Regnault's, as follows:—

$f'' = f' - A\,B(t - t')$ where—

f = vapour pressure at air temperature.

f' = ,, ,, at wet bulb temperature.

f'' = ,, ,, at the temperature of saturation, corresponding to the amount of water vapour present, i.e., the temperature of the "dewpoint."

$\frac{100f''}{f}$ is the relative humidity, i.e., the percentage of water vapour present compared with the saturation pressure at the air temperature, taken as 100.

t = air temperature, t' = wet bulb temperature.

A a coefficient depending on the instrument.

B ,, ,, on the barometric height: of secondary importance under ordinary conditions.

The vapour pressure, or the weight of water per standard volume, increases with temperature, but at a greater and increasingly greater rate, so that if the difference between the temperatures shown by the wet and dry bulb thermometers is constant, the higher the air temperature the closer is the saturation temperature (dewpoint) to it and the higher the relative humidity, e.g., taking dry bulb as 15° C., wet as 10° C., the depression of the dewpoint is 10·9° C. and the relative humidity forty-eight per cent.

With 35° and 30° C. the depression of the dewpoint is 6·8° C. and the relative humidity sixty-eight per cent.

(*c*) Ventilation.—The question of the exposure of the instrument, i.e., the amount of ventilation, is one of considerable importance for purely meteorological purposes, where observations have to be reduced to a common standard. Jelinek uses in his tables the following coefficients for A under the conditions specified:—

	Wind velocity	Coefficient
(*a*) Still air	0—5 metres per second 0—1·1 miles per hour	0·001200
(*b*) Slight movement	1—1·5 metres per second 2·2—3·4 miles per hour	0·000800
(*c*) Strong movement	2·5 metres per second and over 5·6 miles per hour and over	0·000656

The Smithsonian meteorological tables are calculated on the assumption of a velocity of not less than three metres per second. It is important to note that the maximum velocity is limited and comparatively small. The meaning is that saturation of the layer of air in contact with the damp surface takes an appreciable time, and too rapid change of this layer involves a less complete saturation of a larger quantity of air as compared with a more complete saturation of a lesser quality. One would expect to find the maximum velocity increasing with temperature, and the optimum velocity for really high air temperatures may be greater than that given above.

For the purpose of comparison with the incidence of heat-stroke, however, we do not want a standard value; what is needed is the record of an instrument exposed as nearly as possible under the same conditions as the persons under observation. Our comparison can in no case be very accurate: on the one hand the temperature of the wet bulb thermometer is not influenced by clothing or by exercise; on the other, even in a room, the constant movement of the individual causes some positive ventilation. Our greatest difficulty in comparison arises from the fact that the meteorological observations are not made contemporaneously with the occurrence of cases of heat-stroke, nor are the elements recorded always strictly comparable. The want of synchronism is probably less important, in that the actual occurrence of heat-stroke is the crisis, a condition taking some time to develop; there is indeed some evidence that it is preceded not infrequently by a departure from normal health. (It would be interesting to ascertain how often cases of heat-stroke had a previous history of diarrhœa—or of polyuria.) But where we get (what are perhaps the only

Twenty-five to thirty grammes of water per cubic metre is consistent with a range of temperature between 26° C. (78·8° F.) and 40° C. (104° F.), with corresponding relative humidities of from 100 per cent to 50 or 60 per cent. The small number of cases at high wet bulb temperatures and absolute humidities is probably due to the rarity of the climatic condition. It is at first sight surprising to find so distinct an incidence at comparatively low wet bulb temperatures, but the histories of these cases would probably show the influence of clothing, exercise, and imperfect ventilation. The steady increase up to wet bulb temperatures of 76° to 79° F. and absolute humidities up to twenty-five grammes per cubic metre, with a marked increase beyond these limits, is well marked. No closer approximation than is possible from the construction of the figures appears desirable in view of the uncertainty as to the actual temperature values, but whatever correction may be necessary in that respect will only alter the absolute values of the wet bulb temperatures and humidities, not the sequence in the degrees of incidence. The results are quite consonant with the results of Haldane's experiments and the conclusions he has drawn from them as to the various critical temperatures.

(6) With regard to the wet-bulb temperature the following cases are possible :—

(i) *The wet bulb temperature is higher than that of the naked and moist skin.*

(*a*) Air Saturated.—The air temperature, the wet bulb temperature, and the temperature of the dewpoint are the same. Condensation will take place on the skin. This condition occurs only in exceptional instances. Haldane's Experiment No. I, in Dolcoath Mine, dry bulb 94° F., wet bulb 93° F., is the nearest approach which has been found. Here some clothing was worn.

(*b*) Air not Saturated.—The difference between the dry and wet bulb temperatures is such that the dewpoint is higher than the temperature of the skin. Condensation on the skin will again occur. This condition is still more difficult to realize: Haldane's Experiment No. VIII, dry bulb 104° F., wet 94·5° F., gives a dewpoint about 92° F., with a water content of thirty-five grammes per cubic metre. Experiment No. X, on the other hand, dry bulb 182° F., wet 97·2°, gives an approximate dewpoint of 68° F. with a water content of seventeen grammes. Both these experiments were made in specially heated rooms; in the latter the high external temperature must have influenced the body heat considerably.

(ii) *The wet bulb temperature is the same as that of* (*a*) the

naked skin; (*b*) the skin-shirt layer of air. In each case there must be equilibrium; no further evaporation can occur. Wet bulb temperatures over 93° F. were reached in many of Haldane's experiments, but these temperatures appear only to occur under artificial conditions.

(iii) *The wet bulb temperature is lower than that of the skin of a naked man* (93° F.) or of the skin-shirt layer of air (89° F.). Here we are no longer dealing with experimental conditions only, but with those arising from climatic or industrial necessities.

Haldane's "critical points," i.e., wet bulb temperatures above which body temperature begins to rise at an accelerating rate, are these:—

Air	Rest	Work
Still	88° F. ..	78° F.
Moving	93° F. ..	85° F.
Rate, miles per hour ..	2 ..	1½

(Work was done at the rate of 2,590 foot-pounds per minute.)

Examples.—A paper mill, 93° F. dry, 87° F. wet; 95° and 84°; 101° and 88° (Pembrey and Collis, *Journal of Physiology*, xliii, 1911).

Observed Wet Bulb Temperatures.

	Degrees F.	
Hong Kong Observatory ..	83·9	
Straits Settlements	86·0	Over 80° not uncommon.
Alipore	82·3	,, ,, ,,
Kimberley	77·7	

Wet bulb temperatures between 80° and 85° F. are then not uncommon. The important case for the soldier is work in the open air. The velocity given, a mile and a half per hour, at the critical point, 85° F., is a movement practically imperceptible in the open. Hence under ordinary conditions a somewhat higher velocity would probably permit of a higher wet bulb temperature. In the following examples of combinations occurring naturally, the working out has of necessity been done with the Smithsonian tables, which are calculated for a wind velocity of 6·7 miles per hour, which is less than that given on the Beaufort scale as "a light air, just sufficient to give steerage-way," and is in practice a very ordinary minimum velocity.

	Degrees F.	Degrees F.	Per cent.	Grammes per cubic metre
Wet bulb temperature,	85	Dry, 87·3	Relative humidity, 91	Water, 28·6
,, ,,	85	,, 104	,, ,, 46	,, 24·2
,, ,,	85	,, 109	,, ,, 37	,, 22·3
,, ,,	85	,, 118	,, ,, 25	,, 20·5

These examples emphasize the fact that with high air temperatures a low relative humidity obscures the fact that the actual water

content of the air is considerable. In each of these examples, except the last, the difference from the saturation value at 89° F. (thirty-three grammes) is less than ten grammes, which Rogers's cases (see fig. 2) have shown to be effective in the production of heat-stroke.

Air temperatures of 104° F. are not uncommon even in South Africa, while considerably higher temperatures, up to 118° F., are recorded in India, often, however, with humidities as low as ten per cent or exceptionally five per cent. Now, as many of us know, these high temperatures accompanying hot winds are, to use Blanford's words ("Climates and Weather of India") "if not exactly agreeable, borne without serious inconvenience," even while making considerable exertions. An extreme example of this type of climate is quoted by Hahn ("Klimatologie"), where in the Death Valley, California, the observers of the American Weather Bureau recorded air temperatures of 122° F. with wet bulb 73·4° F. to 77° F., 113·9° F. and 66·9° F., 117·9° F. and 69·8° F., the last two giving dewpoints of 27·3° F. and 30·2° F. respectively, or 3·8 grm. and 4·5 grm. water per cubic metre. In these arid climates, the trouble is dehydration, not hindrance to evaporation.

(7) *The Saturation Deficit.*—As Hahn points out, at a constant temperature, evaporation is proportional to the *difference* between the amount of water present in the air and the amount which it can take up at that temperature, the *saturation deficit.* In relation to heat-stroke, for a clothed man we must take not the observed air temperature, but that of the skin-shirt layer of air (which for ordinary conditions of movement and external temperature at least is 89° F.), as it is in this layer that evaporation takes place. Haldane's experiments show that the body is very sensitive to small variations in the wet bulb temperature and, therefore, in the saturation deficit at the critical points, and Rogers's table shows the rapid increase in the number of cases as the saturation deficit diminishes. The saturation weight at 89° F. is 32·9 grm. per cubic metre; the deficit can easily be estimated on looking through the table.

(8) The result then is, taking conditions which occur under ordinary circumstances in hot climates, and working out the actual weights of water in the air, that even at low relative humidities, when the wet bulb stands at the critical point (worked out for 85° F.) there is sufficient water vapour in the air to interfere to an important degree with evaporation from the skin, and so to lessen to a serious extent the loss of heat from the body. Haldane's

results then are applicable to the ordinary climatic conditions of hot climates, and the fact that the relative humidity may be low gives an entirely false impression of the actual conditions as regards the quantity of water vapour present.

(9) *Certain Points on which Observations would be Useful.*—(*a*) Skin temperatures at work and during rest, especially in climates of the desert type, as in the Punjab hot weather.

(*b*) Rectal temperatures synchronous with (*a*) to ascertain whether the temperature gradient remains constant.

(*c*) Skin-shirt layer temperatures, avoiding contact with the skin.

(*d*) Temperatures of the outer surface of the clothing, taken in the shade and as far as possible fit for comparison with *a*, *b*, and *c*.

(10) The thermometers used should be Kew certificated, and of recent date. Clinical thermometers of this type can be obtained for 2s. 9d. at the Army and Navy Stores. For *a*, *c*, and *d*, thermometers with a longer range are required: suitable chemical thermometers can be obtained for about 2s., but it would be necessary to have a standard certificated thermometer for comparison. Old clinical thermometers cannot be trusted for the measurement of comparatively small differences of temperature, which may be less than the errors of the thermometers used.

OSMOSIS.

By Colonel R. H. FIRTH.

Some time ago I submitted articles to this Journal on colloids and solutions. Complementary to the questions discussed in these articles is the problem of osmosis and osmotic pressure. In the following pages an attempt is made to discuss the subject from the point of view of recent research. The topic is admittedly difficult, but in spite of complexities, it is hoped that what I have to say may be helpful to others in obtaining a grasp of a physical phenomenon familiar to most of us, and one, certainly, playing a big part in many everyday physiological processes. From this aspect, its discussion and comprehension by medical officers is eminently fitting for a place in our Journal, and really a matter of how far we can keep abreast of modern knowledge.

I.

Since any attempt to explain osmosis and osmotic pressure is synonymous with an attempt to expound a property of solutions, and as there is a certain parallelism between gases and solutions, the interpretation of that or any other property of a solution involves the appreciation of certain features which characterize the gaseous state. It is necessary, therefore, to recall the facts. For physico-chemical purposes, the fundamental facts as to the behaviour of gases are summed up in three laws, two of which are purely physical and one is purely chemical. The first is Boyle's law, which states that the volume occupied by a given mass of gas varies inversely as the pressure to which it is subjected, provided the temperature is constant. The second is Gay-Lussac's law which says that the volume occupied by a given mass of gas, kept under constant pressure, increases as its temperature is raised. The third is Gay-Lussac's law of volumes, which states that when two gases combine with each other to form a third gas, the volumes of the reacting gases are in a simple ratio to one another and to the volume of the gaseous product, all volumes being measured at the same temperature and pressure. These so-called laws are of course quite independent of any theory regarding the nature of gases; they are simply the expression of experimental results. Further, as bearing on the nature of gases, two theories demand a reference. One is the kinetic theory, which involves a definite

conception of what happens when the temperature of a gas is raised, and amounts practically to the statement that the kinetic energy of the gas molecules increases proportionately to the absolute temperature. The other theory is that of Avogadro; according to this hypothesis, equal volumes of different gases, measured at the same temperature and pressure, contain the same number of ultimate particles. The ultimate particle of a gas is not the atom, but the molecule, which may contain one or more atoms of the element. The acceptance of Avogadro's proposition as a working hypothesis is general, and leads to a conception of the relation between the atom and the molecule of gaseous elements, and to a conception of the definite relationship between density and molecular weight. As we shall see later on, these considerations in respect of gases are of fundamental importance towards appreciating the real nature of that property of solutions known as osmosis.

In a similar manner, the facts underlying the diffusion of a gas are of importance in comprehending the corresponding behaviour of a solution; we have to bear in mind that diffusion is a phenemenon characteristic of both gases and solutions, and in the latter is to be regarded as a molecular movement rather than as a movement in mass. Just as we conceive the pressure of a gas driving the molecules from points of high concentration to places of low concentration, so we can conceive the molecules of a dissolved substance as diffusing under the influence of a pressure which is called the osmotic pressure. Similarly, as gaseous pressure may be realized and measured at some surface blocking expansion, so osmotic pressure can be realized and measured at an interposed surface blocking diffusion of the dissolved substance. For such a surface or interposed membrane to be effective in indicating and measuring the tendency to expand of the dissolved substance only, then it must differentiate between solute and solvent, allowing free passage to the solvent, but blocking the passage of the dissolved substance; in other words, it must be a semi-permeable membrane. Given such conditions, the system is not in equilibrium, and equilibrium will be reached only when the concentration of the dissolved substance is the same on both sides of the membrane. Since the dissolved substance is prevented from diffusing, equilibrium can be established only by water passing through the membrane into the solution.

By osmosis one denotes the whole process of diffusion through a membrane or permeable septum; it is represented by the

circumstance that when a salt solution is separated from water by means of a membrane of pig's bladder, the water diffuses more rapidly through the septum than the salt. The level of the solution rises in consequence, producing hydrostatic pressure, and since this pressure is brought about by the osmosis it is called an osmotic pressure. An elementary fact connected with this phenomenon is that the difference between the rates of osmosis of pure water and of salt solution depends not only on the nature of the salt but also on the concentration of the solution and on the nature of the membrane or permeable septum employed. Originally the process of osmosis was regarded as consisting of two diffusion currents in opposite directions, but Graham's work with colloids showed that the osmosis was restricted to the passage of water through the membrane. Influenced by the knowledge that the precipitate produced by the interaction of two colloids is also a colloid, Traube experimented with a non-setting glue and tannic acid. If a drop of this glue on the end of a glass rod be immersed in a solution of tannic acid, a precipitate is produced which forms a coating on the drop. The precipitation membrane so formed was found to be impermeable to the membrane-forming substance and to potassium ferrocyanide, but permeable to water, ammonium chloride, ammonium sulphate, sulphuric acid, and to barium nitrate. In fact, this glue-tannic acid membrane was the first example known of an artificial membrane permeable to water but impermeable to a so-called crystalloid. Later, a number of similar precipitation membranes, such as lead and copper tannate, lead or copper or tin silicate, and copper or ferric ferrocyanide, were prepared. These membranes, however, were selective in their action, and differed in their permeability to dissolved crystalloids. The discovery of these membranes was of great importance, as it made it possible to determine experimentally the value of the force producing osmosis. So long as experimenters were dealing with a membrane permeable to both the solvent and the solute, the hydrostatic pressure obtained depended on the relative permeability of the membrane to solvent and solute. In proportion, however, as the membrane is relatively less permeable to the solute, the observed hydrostatic pressure or osmotic pressure will increase, reaching a maximum when the membrane is quite impermeable to the solute but still permeable to the solvent. A membrane permeable to only one component of a binary solution is usually spoken of as a semi-permeable membrane.

II.

A typical and natural semi-permeable membrane exists as a covering to barley grains. That covering exhibits selective action when placed in aqueous solutions of sulphuric acid or of common salt and various other substances; water being absorbed by the grains but the dissolved substance failing to enter the grain. This covering of barley grains acts as a semi-permeable membrane irrespective of the grain being alive or dead; consequently its semi-permeability is not dependent on the activity of any living protoplasm. If barley grains are placed in a solution of sodium chloride, the salt is unable to penetrate the covering, and there ensues merely a competition for water between the grain contents and the solution, the amount of water which the former can attract depending on the concentration of the salt solution. As this is raised, the barley grain absorbs less and less of water. On the other hand, when barley grains are steeped in a solution of a substance like acetic acid which can penetrate the covering, then there is no competition for the water, and the amount of water absorbed is practically the same as when the grains are steeped in pure water. The existence of this comparatively impermeable covering of seeds and grains explains why we can steep wheat and other cereals in copper sulphate to destroy fungus spores adhering to the surface, and yet not affect the vitality of the seed grain itself.

Of artificial semi-permeable membranes we find a common example in the membrane or skin of copper ferrocyanide, which is formed round a drop of copper sulphate when such a drop on the end of a glass tube is dipped into a solution of potassium ferrocyanide. This membrane of copper ferrocyanide is not only impermeable to copper sulphate and potassium ferrocyanide, but also to some other substances such as sucrose and dextrose. We can regard it, therefore, as semi-permeable in regard to water and sucrose and water and dextrose. For purposes of qualitative and quantitative measurement, this copper ferrocyanide membrane has been employed largely in exact experiments, the easily ruptured membrane or skin being supported on some more or less rigid framework, such as porous pots of unglazed porcelain.

The question arises, why is a membrane permeable to one substance and yet impermeable to another? The work of Traube, in the sixties and the seventies of the last century, suggested that the faculty by which a membrane differentiated between one substance and another was due to the size of its molecular

interstices or, in plain language, it acted like a sieve. Later work, however, presents facts which are opposed to this view. For instance, if methyl alcohol and ether be separated by a septum of pig's bladder an osmotic flow sets in from the alcohol to the ether. If, however, the septum be of vulcanized caoutchouc then the osmosis is in the opposite direction. Now, it is known from Tammann's experiments that pig's bladder absorbs ten times as much methyl alcohol as ether and that caoutchouc absorbs about one hundred times as much ether as methyl alcohol. The direction of the osmotic flow is therefore determined by the preferential absorption of either of the two liquids by the membrane. This view is supported by such an experiment as the following. Cut three inches of glass tubing of fairly large calibre. Fasten and seal securely a piece of pig's bladder over one end. Plug the other or lower end with a rubber stopper itself perforated by or carrying a glass tube, which at its other end is connected with some simple manometer or other device for indicating changes of pressure. If the pig's bladder membrane be soaked with water, and a bell jar, filled with hydrogen, be inverted over the short glass tube whose upper end is closed by the bladder, then no appreciable pressure change will be observed in the manometer or pressure change indicator. If, however, ammonia gas be substituted for the hydrogen in the bell jar then a positive rise in pressure is obtained. The explanation is that ammonia gas is very soluble in water while hydrogen is not. The same selective absorption influence of the septum is shown by the following osmotic cell suggested by Crum Brown. Shake up phenol and water together until two mutually saturated layers are obtained, namely, a lighter layer (1) containing excess of water, and a layer (2) containing an excess of phenol. Pipette off a sufficiency of the upper (1) layer and then dissolve in it some nitrate of lime, sufficient to make it heavier than the other (2) layer. Pour this into a narrow cylindrical glass and then pour a small quantity of layer (2) carefully upon it. Above or on to this again pour carefully a considerable quantity of the original (1) layer. The difference between the top and bottom layers will be that the latter contains calcium nitrate while the former does not, and between them is a liquid septum in which phenol predominates and in which nitrate of lime is very sparingly soluble. The medium, however, in which the nitrate is dissolved is readily soluble in the liquid septum, so that we have in the glass a solution below separated from its solvent by a septum permeable to that solvent, but nearly impermeable to the dissolved substance. If the glass be allowed to

stand, the solution layer at the bottom increases gradually at the expense of the solvent, and the intervening liquid septum moves slowly up the cylinder. The facts quoted suggest that the efficiency of a semi-permeable membrane depends entirely on its ability to differentiate, by solvent or absorption action, between the substances which seek to penetrate it.

We are in a position now to inquire how far these views help towards an interpretation of the complex phenomena connected with the permeability and impermeability of living membranes. To Overton's work on plasmolysis and the treating of plant cells with various substances, we owe much of our present knowledge on these matters. By plasmolysis is meant the phenomenon of a retraction or separating of the protoplasmic membrane, which encloses the cell sap from the outer or containing cell wall, when the cells are immersed in strong solutions. If the roots of the plant hydrocharis are immersed in 7·5 per cent sucrose solution very distinct plasmolysis occurs, vanishing instantly when the roots are dipped into pure water and reappearing when they are replaced in the 7·5 per cent sucrose solution. Similar results are obtained with other substances, and the conclusion is drawn that the protoplasmic membrane is strictly semi-permeable in all the cases. If substances like ethyl alcohol be used and for which the protoplasmic membrane is highly permeable, no plasmolysis is produced. In other experiments, taking advantage of the fact that the sap of many plant cells contains tannin, which forms slightly soluble precipitates with certain chemical compounds, Overton showed that the greater or lesser permeability of the protoplasmic membrane is demonstrable by the more or less rapid formation of a precipitate in plant cells which contain tannin, when the cells are dipped in certain aqueous solutions. A consideration of the facts led Overton to the view that the cell membrane is endowed with a selective absorbability and that the compounds to which the cell membrane is permeable are generally soluble in fatty acids or oil, and that it probably consists of a substance which resembles them in solvent power. This idea of the lipoid nature of the plasmatic membrane has been accepted generally, but it is not quite free from criticism, as some dyes which are soluble in lipoids do not penetrate the membrane and others which are insoluble in the fats penetrate the membrane readily.

So far as relates to the living cell membrane, a purely physical theory of permeability is not free from difficulties. For instance, the permeability of a cell membrane alters when the cell dies.

Again, take the case of blood-corpuscles; their cell fluid is rich in potassium and phosphate while the plasma is poor in these but rich in sodium and chloride. As the corpuscles receive nutriment from the plasma which bathes them, their membrane cannot be absolutely impermeable to potassium salts, neither could these salts be retained in the corpuscles if their membrane be absolutely permeable. We can but assume some specific obstruction on the part of the living membrane, or some specific affinity between the potassium salts and the protoplasm. Take also the case of the kidney; the urine contains considerable urea and the blood very little. This difference cannot be explained by a purely osmotic agency in the kidney. Further, difficulties are presented by tadpoles. In a 6 per cent sucrose solution, or a 0·6 per cent sodium chloride solution, they are unaffected, but put them into an 8 per cent sucrose solution, or a 0·8 per cent sodium chloride solution, and the tadpoles shrivel up from loss of water. These facts suggest the inadequacy of a purely physical theory of the exchanges through living membranes, and compel us to realize that there is such a thing as physiological permeability as well as a physical permeability. The question is further complicated by some other facts. Normally, the plasmatic membrane of plant cells is impermeable to the substance present in the cell sap. By soaking the cells in various aqueous solutions, it is possible to destroy the impermeability of the membrane and for each such substance there is a critical concentration at which the impermeability is damaged or destroyed. In the fatty alcohols the critical concentrations are 14 per cent for methyl alcohol, 9 per cent for ethyl alcohol, 4 per cent for *n*-propyl alcohol, 1·5 per cent for *n*-butyl alcohol, and 0·5 per cent for amyl alcohol. Now, it is significant that all these concentrations or critical solutions have the same surface tension, or 0·689 that of water. Further, the surface tension of the saturated emulsions of glycerides of the unsaturated fatty acids is 0·685 that of water. This is interesting moreover, in connexion with Overton's view of the lipoid nature of the plasmatic membrane and favours the conception of it as being a very fine fat emulsion, permeable for water and substances soluble in water.

III.

At an earlier stage of this article, osmotic pressure has been stated to be the equivalent of the hydrostatic pressure produced when a solution and solvent are separated by a perfectly semi-permeable membrane; or putting it in other words, as the

equivalent of the excess pressure which must be imposed on a solution to prevent the passage into it of solvent through a perfectly semi-permeable membrane. From this it must not be deduced that a solution has of itself any osmotic pressure; the pressure is only manifest under the conditions stated, and it is osmosis which produces the pressure, not osmotic pressure which produces osmosis. Perhaps the most simple attitude to adopt is to identify the osmotic pressure with the expansive force which brings about diffusion; hence, if we can measure the tendency of water to pass into a solution through a semi-permeable membrane or measure the force of the attraction between solvent and solution, we can determine the osmotic pressure of the solution. Leaving aside the question of what is the nature of osmotic pressure, whether it be of kinetic origin like the pressure exerted by a gas on the walls of a containing vessel, or whether it is simply the expression of the attraction between solvent and solution, or whether it be related to surface tension, we find that there is a remarkable parallelism between the properties of gases and those of dissolved substances.

The earliest work on osmotic pressure was that by Pfeffer in the seventies of the last century. Working with a porous pot having a semi-permeable membrane of copper ferrocyanide deposited close to its inner surface, and the pot connected with a closed manometer, Pfeffer measured the osmotic pressure of many solutions. He found that the osmotic pressure exerted by a given substance in solution increased with the concentration. As, however, the concentration of a given quantity of a dissolved substance is inversely as the volume which the solution occupies, the osmotic pressure exerted by a given quantity of a dissolved substance is inversely proportional to the volume of the solution: a statement curiously resembling Boyle's law for gases. It was further shown that the osmotic pressure increases as the temperature rises, which suggests at once a proposition corresponding closely with the statement of Gay-Lussac's law for gases. A further step was made by the extension of Avogadro's hypothesis to solutions, and the generalization advanced by van't Hoff, that, at a given temperature, equal volumes of two dilute solutions which have equal osmotic pressures contain the same number of dissolved molecules. This leads directly to the conclusion that the osmotic pressure of a dilute solution is equal to the pressure which the dissolved substance would exert if it were in the gaseous state at the same temperature, and occupying the same volume as the solution. This does not

imply that osmotic pressure and gas pressure must be due to the same cause, and so far as osmotic pressure is concerned, is quite independent of the particular view which may be held in regard to the origin of osmotic effects. In this connexion we can conceive that each molecule of a dissolved substance influences the molecules around it so as to form a more or less loosely connected complex, in the sense of physical influence but not of chemical union. Further, it is immaterial whether the nucleus of the complex is one or many molecules, or even the entity known as an ion; all the pressure phenomena are determined merely by the number of complexes per unit volume.

Reference has been made to the parallelism between the properties of gases and those of solutions, consequently, it follows that the behaviour of substances in dilute solution must be governed by an equation exactly analogous to the gas equation, $pv = RT$. If so, we can express the theoretical value of the osmotic pressure by the equation, $PV = R'T$, in which P is the osmotic pressure, V is the volume of solution which contains one gramme-molecule of solute, T is the absolute temperature, and R' is a constant for all dissolved substances and known to be 0·082 or the same as the constant for gases. Assuming we have a 1 per cent solution of sucrose, then V or the volume of solution which contains one gramme-molecule or 342 grm. will be 34·2 litres and T or the absolute temperature will be 273. Transposing the equation, we get P to equal $\frac{R'T}{V}$ or $\frac{0{\cdot}82 \times 273}{34{\cdot}2}$, which works out as 0.654 atmospheres. The essential point to grasp in this matter is that what is gas pressure in one case is osmotic pressure in the other, and that what is the volume occupied by one gramme-molecule of gas in the one becomes in the other the volume of solution which contains one gramme-molecule of solute.

Recent work, notably that by Morse, Frazer, Lord Berkeley, and Hartley, has gone far to extend and confirm Pfeffer's work. Experimental details have been much improved, with the result that pressures up to and over 20 atmospheres have been recorded for a variety of substances with accuracy. It is noticeable that, relatively, the osmotic pressures are higher in dilute solutions than in those of great concentration. It is unnecessary and impracticable to go into details as to the exact methods employed, but it suffices to say that they involve the use of porous pots and the deposition of a copper ferrocyanide membrane within the cell wall. The outcome of this newer work is to the effect

that the osmotic pressure of a solution is proportional to the concentration, provided the concentration is referred to unit volume of the solvent and not to unit volume of the solution. Further, it has been shown that from 0° to 25° C., the law of Gay-Lussac for gases is equally applicable to solutions, that is, the temperature coefficients of osmotic pressure and gas pressure are equal. Certain discrepancies between observed and calculated values in the experimental results with high concentrations are explicable by the assumption that the dissolved substance is hydrated, or that each molecule in the case of sugars has attached to it five water molecules. This is in agreement with the value for the average molecular hydration of sucrose deduced from the influence of that substance on the solvent power of water for gases.

It will be obvious that the direct determination of the osmotic pressure of a solution is difficult and dependent upon a high standard of experimental technique, but there are other properties of solutions which are quantitatively related to osmotic pressure and serve indirectly for its estimation. Such are the vapour pressure and the boiling and freezing points of solutions. The mere fact of the existence of osmotic pressure involves the consequence that a solution of a non-volatile substance must have a lower vapour pressure than the solvent at the same temperature. Investigation shows, further, that when the dissolved substance is non-volatile, the vapour pressure of a dilute solution is lower than that of the pure solvent at the same temperature by an amount which is proportional to the concentration of the dissolved substance. Expressed mathematically the relation between the osmotic and vapour pressures of a solution can be written as the following equation, $P = \frac{SRT}{M} \times \log \frac{p}{p'}$, where *P* is the osmotic pressure and *p'* the vapour pressure of the solution; *p* is the vapour pressure, *M* is the molecular weight, and *S* the specific gravity of the solvent; *T* is the absolute temperature and *R* the gas constant. Actually it is not necessary to know the absolute values of *p* and *p'*, a knowledge of the ratio of the vapour pressure of the solvent to that of the solution being sufficient. A simple way of finding this ratio is the following: Draw a current of air slowly through (1) some bulbs charged with the aqueous solution under examination, and also through another set of bulbs (2) similarly charged, also through some bulbs containing water (3), and finally through other bulbs (4) containing

sulphuric acid. When the air leaves (2) it is charged with water vapour according to the pressure of the solution; when it leaves (3) it is charged with water vapour according to the pressure of pure water at the same temperature. In passing over the sulphuric acid the air loses all the water it has taken up, and the gain in weight of this tube or bulb is proportional to p, while the loss in weight of the water containing bulbs (3) is proportional to the difference p minus p'. After a current of air has been passed for some time, the loss in weight of (3) and the gain in weight of (4) gives the ratio of the vapour pressures, and from this $\frac{p'}{p}$ can be calculated and the value of the osmotic pressure or P worked out from the formula.

Since the boiling point of a liquid is the temperature at which its vapour pressure is equal to the atmospheric pressure, it follows that in the case of a non-volatile solute its vapour pressure curve lies below the corresponding curve for the pure solvent, and the solution must be raised to a higher temperature before its vapour pressure becomes equal to the atmospheric pressure, or, in other words, the boiling point of the solution is higher than that of the solvent. Further, the raising of the boiling point is quantitatively related to the lowering of the vapour pressure, and therefore also to the osmotic pressure. The relation between the osmotic pressure of a dilute solution and its boiling point is given by the formula $P = \frac{1000SL}{24\cdot25} \times \frac{T-t}{t}$ in atmospheres, where S is the specific gravity of the solvent at its boiling point, L is the latent heat of vaporization for one gramme of the solvent, T is the boiling point of the solution, and t the boiling point of the solvent. Suppose for an aqueous solution, S is 0·982, that L is 425, and t is 373 on the absolute temperature scale. In this case, the osmotic pressure of an aqueous solution which boils T-t degree above the boiling point of water works out as 46·1 atmospheres, or 4·6 atmospheres for each 0·1 degree the solution boils higher than water. In estimations of this kind, the determination of the boiling point is made by either a Beckmann's or a Landsberger apparatus. Similarly, the freezing point is determined by a corresponding appliance.

The relation of the osmotic pressure to the freezing point of a solution is governed by the fact that the freezing point of a solution is lower than that of the solvent. This depression of the freezing point being dependent on the vapour pressure of the solution, it follows that the extent to which it is lower than that of the

solvent bears a quantitative relation to the osmotic pressure of the solution. The relation between the two is given by the formula, $P = \frac{1000SH}{24\cdot25} \times \frac{t-T}{t}$, where S is the specific gravity, t the freezing point, and H the latent heat of fusion of the solvent, while T is the freezing point of the solution. Assuming the solvent is water, then S is 1, H is 79·6 and t is 273 on the absolute scale and the formula works out as 12·02 and P equals 12·02 (t-T) atmospheres. Now, the freezing point of a 1 per cent sucrose solution is known to be – 0·0546 degree, therefore the osmotic pressure of that solution at 0° C. by the formula would be 0·654 atmospheres, or practically what has been given earlier in this article.

The freezing point method has been much used for the study of the osmotic pressure of the blood from different animals. Similarly, it has been employed for studying the relation between the osmotic pressure of the blood of fishes and that of their surrounding medium. In the case of all invertebrate marine creatures the freezing point of their blood is the same as that of the water in which they live; further, the osmotic pressure of their body fluid varies with the osmotic pressure of their surrounding medium, and when the osmotic pressure of the latter varies then their body fluids undergo a corresponding change as shown by the freezing point. In other words, these creatures are unable of themselves to regulate the osmotic pressure of their body fluids. It is otherwise with many of the marine vertebrates in whom the osmotic pressure of their body fluid is different from that of the surrounding medium, and any great variation in the osmotic pressure of the latter involves but a slight variation of the former. In these cases, so far as osmotic pressure is concerned, the organism is largely independent of the medium in which it lives.

IV.

Apart from the foregoing indirect means of determining osmotic pressure there are other methods available for the comparison of the osmotic pressure of different solutions. These depend on the exchange of water which occurs across a semi-permeable membrane separating two solutions. This exchange is obviously the expression of the attempt to attain equilibrium or equalize the two pressures, and results in the passage of water from the solution having the lower osmotic pressure to that which has the higher. The following simple experiment illustrates this: Fill a tall glass

jar with copper sulphate solution, one gramme-molecule to the litre, fill a pipette with saturated solution of potassium ferrocyanide and hold the same within it by pressure of the finger on the upper end. After placing the lower end of the pipette just below the surface of the copper sulphate solution, let a little of the ferrocyanide run out slowly into the copper solution. Where the two solutions meet a transparent membrane will be formed, so that a sort of bag containing potassium ferrocyanide solution will be obtained attached to the end of the pipette. When it is sufficiently defined, give the pipette a jerk and so detach the bag which will then sink slowly to the bottom of the jar. The solution in the membranous bag will have the greater density and higher osmotic pressure. As the result of this, water will osmose into the bag, dilute its contents, distend it and gradually make it lighter so that it will rise slowly in the jar until its contents become not only equal to but less in density than the surrounding copper sulphate solution. When two solutions have the same osmotic pressure they are said to be isotonic.

For the comparison of the osmotic effects of different solutions or substances and the discovery of isotonic solutions, not only precipitation membranes, but those of plant and animal cells are employed. The plasmolytic method is particularly suitable for use with plant cells. A ready means of demonstrating the phenomenon is to make thin shavings of beetroot, washing away all juice from the damaged cells with water, and then steeping for two hours in 5 per cent sodium chloride solution. The salt solution produces plasmolysis, as will be seen by microscopic examination, the protoplasm being seen to have retreated from the cell wall at one or more points. When working with cells having colourless contents, the phenomenon is readily made evident by adding some simple dye to the plasmolysing salt solution. To obtain isotonic solutions of two salts, it is necessary to find what concentrations of each produce the same plasmolytic effects in the cells of some suitable plant. Thus, using the plant *Begonia manicata*, suppose no plasmolysis results when the cells are immersed in sucrose solution of 0·20 of a gramme-molecule per litre, but that they are plasmolysed when dipped in sucrose solution of 0·22 gramme-molecule per litre. Similar and parallel experiments are made with potassium nitrate and suppose it is found that no plasmolysis follows treatment with a solution of 0·12 gramme-molecule per litre, but does occur when the potassium nitrate is 0·13 gramme-molecule per litre. Obviously, the sucrose solution of 0·22 gramme-molecule per litre is isotonic

with a potassium nitrate solution containing 0·13 gramme-molecule per litre. Their ratio is 0·59, and as osmotic efficiency increases proportionately to the concentration in each case the reciprocal of this ratio, or 1·69, represents the osmotic efficiency of a potassium nitrate solution, taking a sucrose solution of the same molecular concentration as unity. The mean of the above-mentioned sucrose solutions is one of 0·21 gramme-molecule per litre; now, according to Morse and Frazer, a sucrose solution of that strength has an osmotic pressure of five atmospheres, therefore this figure must be approximately the osmotic pressure of the cell sap in the cells of plants which plasmolyse in a sucrose solution of the same strength. Some plant cells show an increase of osmotic strength as the acquisition of water becomes more difficult for them; thus, the isotonic solution of sodium chloride for certain bog plants was 0·11 gramme-molecule per litre when the plants came from sandhills, but 0·51 gramme-molecule per litre when the plant came from a marsh.

Some plant cells have the power of varying their internal osmotic pressure according to their surrounding medium, and also of accommodating themselves to highly concentrated media. This is notably the case with moulds and bacteria. Penicillium and aspergillus thrive in solutions the osmotic equivalent of which is as high as 20 per cent potassium nitrate, and *Bacillus anthracis* grows well on agar containing as much as 10 per cent of common salt. The plasmatic membrane of many bacteria is very permeable, and it is suggestive that the permeability is greatest in these bacteria which are able best to thrive in concentrated media. Among the moulds, permeability of the membrane seems not to be responsible for the power of accommodation which they display; in their case, the production of an osmotically active substance in the cell itself as the result of metabolism appears to balance any increase in the concentration of the external medium. In spite of this adaptability to extreme osmotic conditions, a sudden transference from a very dilute to a very concentrated solution or vice versa has usually a serious consequence for the cell. This is specially the case among the algæ when they are transferred suddenly from a highly concentrated to a very dilute solution; the result is generally a bursting of the cell.

Of animal cells, the blood-corpuscles have been much used for determining isotonic solutions, advantage being taken of the fact that the corpuscular membrane is permeable to water, but impermeable to many dissolved substances. When blood cells are

immersed in water, they first swell in consequence of osmotic pressure, and then burst, the disruption allowing the hæmoglobin to escape with the production of the so-called "laking." The laking result, for all solutions, is commensurate with a certain limiting concentration. Solutions of any two or more salts which are equivalent in osmotic effect, as indicated by laking of the corpuscles, are to be regarded as isotonic. It is noteworthy that the limiting concentrations of a salt which produce laking of blood-corpuscles are different for different kinds of blood. For instance, the maximum concentration of sodium chloride which causes laking is 0·21 per cent for frog's blood, 0·47 per cent for human blood, and 0·68 per cent for horse's blood. These differences are connected possibly with different resisting powers of the respective membranes rather than with any varying osmotic strength of the corpuscular contents. For all mammalian blood, the concentration of a sodium chloride solution in which the volume of the corpuscles is unaltered, as evidenced by the hæmatocrit, is approximately the same, namely, 0·9 per cent. Strictly speaking, this concentration is the true physiological salt solution, though the term is commonly applied to a solution of only 0·6 to 0·7 per cent. As a matter of fact, in this weaker salt solution mammalian blood corpuscles do undergo change in volume, and the conventional use of the lower figure is probably due to the circumstance that the earlier experiments bearing on the point were made with frog's blood, the osmotic pressure of which is equal to that of a 0·65 per cent solution of sodium chloride.

From the facts and arguments which have been adduced, it is evident that when a plant or animal cell is steeped in a hypertonic solution of a substance which cannot enter the cell, water passes outwards and the contents of the cell become concentrated. This increase of concentration acts often as a stimulus and affects the activity of the cell. For instance, the formation of starch from sugar that occurs in some plant cells takes place only when the concentration of the sugar has reached a certain limit. The interesting work of Loeb on artificial parthenogenesis[1] with the unfertilized eggs of the sea-urchin and with the spawn of frogs, is clearly an instance of an osmotic stimulus, set up by immersing the ova in hypertonic solutions. It is curious to note that a hypertonic sucrose solution is just as effective in bringing about this artificial parthenogenesis as a hypertonic solution of salt water. There is no certainty as to how these hypertonic solutions exert their

[1] Journal of the Royal Army Medical Corps, January, 1912, p. 51.

influence in bringing about these results, but they probably act by facilitating the oxidation of certain substances in the cells, which, if unremoved, would result in cytolysis.

V.

We are, now, in a position to review the facts and such criticisms as have been advanced of the associated theories. Stated in its most general terms, the cause of osmosis is the difference which exists between the free energy of a solvent in the pure state and of a solution, a difference manifested by the difference in the vapour pressures of the solvent and the solution. This difference of free energy or chemical potential is manifested whether a solution is in direct contact with the pure solvent, or whether they are separated by a semi-permeable membrane. Since, in the latter case, the solute is prevented by the septum from diffusing into the solvent, the production of uniform concentration throughout the system is impossible, and equilibrium can be established only by the free energy of the solvent in the solute acquiring the same value as in the pure state. This is brought about by increasing the pressure on the solution and the diffusion of the solvent into the solute continues until the requisite pressure is established. The pressure is the osmotic pressure and is a function not of the concentration expressed in grammes or gramme-molecules per litre, but a function of the molar fraction. Only in very dilute solutions are the two identical. From these facts, we conclude that the essential function of a semi-permeable membrane is to allow of a pressure being exerted on a solution in contact with the solvent, without any pressure being exerted on the latter.

As to what this semi-permeability is due, some views have been given. The atomic sieve or mesh theory is not altogether satisfactory. Another explanation of membrane permeability is a chemical one and may be expressed thus: "The compounds which penetrate the membrane are all substances which attract water presumably only to a minor extent and which exist to some amount in solution in an unhydrated condition; those which cannot penetrate it, on the other hand, probably all form hydrates of considerable stability in solution." To follow this conception, we must conceive the existence in water of both simple and polymerized molecules in equilibrium, and that water consists of a mixture of active and inactive molecules. The active molecules are either the simple monad hydrone or the diad hydronel.

The inactive molecules are complexes of associated molecules. When a non-electrolyte is dissolved in water, it reacts with the hydrone and hydronel molecules, giving rise to active hydrolated complexes and to inactive hydronated complexes, as well as to polymerides. In the case of electrolytic solutions, we conceive the formation of still more complex molecules. This hydrate theory of solution is plausible and has much support, but there are difficulties in the way of thinking that in all cases there is the formation of compounds between solvent and solute. It is conceivable that in solutions there may be formed a number of very unstable hydrates, and also that definite stable hydrates are formed which persist throughout a large range of temperature and concentration. This view is supported by Mendeleef and brings the behaviour of aqueous solutions into harmony with the thermodynamic theory.

As against this criticism, we can conceive that surfaces, especially the colloid surfaces, as not merely wetted by water but as more or less hydronated and hydrolated; that is, they are not merely wetted by water complexes but associated with hydrone, the simple fundamental molecule of which water is composed. From this point of view, the intra-molecular passages of a membrane would be guarded by the attracted hydrone molecules, and molecules in a solution bathing the membrane which tried to enter these hydrolated passages would be held back, owing to the attraction which the two hydrolated surfaces of the membrane and of the solute would exercise upon each other. On the other hand, the hydrolated passages would be indifferent to non-hydrolated molecules. We here get an explanation why acetic acid passes so readily through these membranes: simply because it is practically never present in solution in the hydrolated state. It is true we are dealing here with theoretical conceptions, but they have a bearing upon a number of more or less obscure physiological phenomena. We conceive, herein, a clue explanatory of the efficacy of mercury salts, of iodine, and of many alkaloids as drugs; moreover, it hints towards the production of therapeutical agents adjusted to their purpose, according to the requirement that they should penetrate this or that cell, membrane, or tissue.

Reference has been made in an earlier part of this article to the explanation of membrane semi-permeability on the basis of selective or preferential solubility. This is probably the explanation most widely held. There are, however, some difficulties. An alternative view is that a semi-permeable membrane consists of fine capillaries which are not wetted by the liquids but merely admit

the passage of vapour, or in other words the membrane is nothing more than a vapour sieve. Since the pure solvent at one end of the capillaries has a higher vapour tension or pressure than in the solute at the other end, distillation will occur from the solvent, and the vapour escaping from or at the other end of the capillary will condense on the surface of the solution. This process will go on till the hydrostatic pressure, produced by the steady addition of solvent to solute, is sufficient to raise the vapour pressure of the latter to a value equal to that of the former. These ideas have been put forward by Callendar and have the merit that they make no assumption as to the nature of solutions, and are sufficiently general to include the surface tension and the hydrate theories.

Diverse as are the views concerning the action of semi-permeable membranes, those regarding the process of osmosis and the nature of osmotic pressure are equally so. Practically these views fall into two classes. On the one hand, there is the kinetic interpretation of osmotic pressure, analogous to the kinetic explanation of gaseous pressure; on the other hand, there is the view that osmotic pressure is a hydrostatic pressure produced by the entrance of solvent into the solute. The first view is traceable to van't Hoff's generalization that the osmotic pressure in dilute solutions is equal to the gaseous pressure which a solute will exercise if in the form of vapour and occupying a volume equal to the volume of the solute. It is an attractive and simple explanation well adapted to an elementary exposition of osmotic pressure, but it does not explain the osmotic pressures of concentrated solutions. Analysed from the point of view of the thermodynamics of the relation between osmotic work and concentration, the kinetic theory fails, as it recognizes only the volume of the solution and ignores the volume of the solvent or rather the increase of volume following the addition of solvent to solute.

Of views that osmotic pressure is a hydrostatic pressure, one of the first held that the osmotic pressure is proportional to the difference between the surface tension of the solution and the pure solvent. Much work has been done to elucidate the accuracy of this view, but it is apparent that the difference between the surface tensions cannot be accepted as equal to the osmotic pressure, since experiment shows that this new pressure is quite different for isosmotic solutions; it is really only the measure of the velocity with which the osmotic pressure rises, and this osmotic pressure is only a counterforce. Although the surface tension theory has appealed to many physicists, careful mathematical analysis indicates it to

be inadequate to account quantitatively for osmotic pressure in the thermodynamic sense of the term; it further breaks down because no exact connexion has really been established between surface tension and osmotic pressure, or the diminution of the vapour pressure of a solvent by a solute, of such a kind that the latter can be calculated from the former. At most, the surface tension theory is a theory of osmosis, not of osmotic pressure, and its utility or importance is mainly physiological. In spite of this restrictive qualification, the theory is of great value and probably goes far towards meeting the undoubted difficulties of what is a very complex problem.

A very cursory perusal of this article will impress the reader that the subject with which it deals is intimately asociated with the constitution of solutions. One cannot in this place deal with that subject, though it may form the basis of a subsequent article. Even now, after reading through what one has written in this paper, one wonders how far its subject matter will be appreciated by ordinary readers, also one wonders how far success has been attained towards presenting a very difficult physical problem in an intelligible form. The rapid developments in physical research are sapping many cherished beliefs in the scientific professions and, recognizing that medicine is not immune to these iconoclastic onslaughts, it behoves us to keep abreast of advancing thought and knowledge. As a humble attempt to help one's brother officers towards a fuller knowledge of a subject, ignored too often as to important details in most textbooks, this article may be helpful to some and perhaps to many. There is little originality about it; one has many hours of leisure in India and some scraps of information picked up in these idle hours have merely been codified into readable shape. As an isolated subject osmosis may not be attractive, but as a property of solutions it has an important bearing upon our conceptions as to the nature of solutions, and also upon the rationale of the action of many of our medicaments. For these reasons, osmosis has appealed to me for study and, perhaps, may appeal to others.

A DAY'S WORK ON THE SUDAN SLEEPING SICKNESS COMMISSION.

By Major H. ENSOR, D.S.O.
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In January, 1908, when a member of the Sudan Sleeping Sickness Commission, I was engaged on the frontier of the Bahr-el-Ghazal Province and the Congo Free State in marking out the palpalis areas in that part of the world, and in examining all natives who allowed of it as to symptoms of trypanosomiasis. To carry out this work I was marching slowly west day by day, and on January 8 arrived at a small fort called Zungumbia, which was occupied by a detachment of the 12th Sudanese Regiment, under the command of a native officer. The place was called a fort, but consisted of three or four huts surrounded by a zareba, the entrance being a gap in the zareba which was closed by a thorn bush at night.

This post had been established solely, I believe, for the purpose of showing the two flags of the Anglo-Egyptian Sudan, the Union Jack and the Star and Crescent, as a symbol of our occupation of the country, at the time when a dispute existed between the Governments of the Sudan and the Congo Free State as to the position of the frontier. The Belgians claimed the country up to the fifth parallel of north latitude, while we insisted on the watershed of the Nile and Congo being considered as the frontier. This dispute had a few months before my arrival at Zungumbia been settled in our favour, and is, of course, now ancient history; but even when it was at its height it never led to any diminution in the friendly feeling which existed between the British and Belgian officers. I personally always found the Belgian officers good and hospitable neighbours, who gave me the best of everything they had whenever I came into contact with them, and I was able to repay their hospitality by treating their sick, a small proportion of whom were cases of sleeping sickness. At the time when the dispute was in its most acute phase the debatable land held several small forts occupied by the black troops of both nations; here one would see the Union Jack and the Star and Crescent, and a few miles away the blue flag and yellow star of the Congo Free State would be in evidence. It was an amusing situation, and I believe that both British and Belgian officers

equally saw its humorous side. The native chiefs were perhaps not so much amused as perplexed, as while the Belgians remained in occupation of their forts in our territory they did not know whether to obey the "Fransa," as they called the Belgians, or the "Turk" as they called the British and Egyptians. However, they scored while this condition of affairs lasted, as they had an excellent excuse to obey neither.

To return to the day's work on the Sudan Sleeping Sickness Commission. On my arrival at Zungumbia I found an old friend among the detachment of Sudanese soldiers, called Serjeant Bindas. He was a fine specimen of the Sudanese soldier; a native of the Bahr-el-Ghazal by birth, who had been captured by Zubeir Pasha when he ruled the Bahr-el-Ghazal, and had passed through Heaven knows how many vicissitudes of fortune before he became a soldier. He spoke the language of the natives, who near this place were mostly of the Zandeh tribe, and was the best tracker and sportsman I have ever met among the Sudanese soldiers. I refer to him in the past tense. About a year ago I heard to my great regret that he had been killed by a wounded buffalo in the north of the Bahr-el-Ghazal Province. He had left the Army, and taken his pension some time previously.

The morning after my arrival I interviewed several natives who were living near the fort, and was particularly interested in one of them, a fine big Zandeh, who stated that he was a sultan. The title sultan in the Southern Bahr-el-Ghazal is not to be taken seriously. Sultans are as often to be met with there as J. Ps. are in Ireland. This particular sultan, however, was interesting inasmuch as he had enlarged cervical glands on both sides of his neck. He could talk no Arabic, but after a long conversation with him through an interpreter, and a small present of salt, he allowed me to take a drop of blood from his finger. This I examined carefully but found no trypanosomes, signs of auto-agglutination, etc. I then wanted to make a gland puncture, and again tried my powers of persuasion backed up by a little more salt. He appeared to consent, but when I advanced towards him with the hypodermic syringe to perform the operation he gave a yell and bolted for the entrance to the zareba. The sentry on duty there, seeing the man rushing towards him, turned out the guard, and I, fearing that the man might be roughly handled, ran after him, shouting to the guard to let him go. The sultan, however, not understanding me, and seeing the guard at the entrance to the zareba, concluded that escape that way was impossible, and turning lightly leaped the

thorn zareba and escaped into the forest. This action on his part showed how useful the zareba would really be in the event of a determined attack being made on it by similar natives.

This incident illustrates the difficulties one has to contend against when carrying out investigations in the uncivilized parts of Africa, and it is quite common to hear persons deploring the ignorance of the natives and the difficulties they raise when required to submit to a microscopical examination of their body fluids. Personally, I think it is wonderful that they permit of any examination at all. To persons who deplore this ignorance and unwillingness to help the bacteriologist I should suggest that they go to some part of London, say Whitechapel, and there attempt to carry out blood examinations on the people. I can imagine the reception they would receive.

This ended the bacteriological work for the day, and as by this time the sun was high and hot, I betook myself, with a native to act as bait, to the shady banks of a small stream near the fort, and made him sit down in front of me in the shade. In a few minutes three or four specimens of *Glossina palpalis* made their appearance with the intention of feeding off the bait. One of them was caught, identified, and another palpalis area added to my map.

On leaving the river-bed Serjeant Bindas came running up to me with the news that a native had come in and reported that a large herd of elephants was in the neighbourhood, moving leisurely along the banks of the river about half an hour's march away. This was important news, and I decided that it justified my giving myself local leave on the spot for the purpose of investigating the report as to elephants being in the vicinity. I sent for my heavy rifle, a double barrelled ·400, and cartridges, and accompanied by Serjeant Bindas and the native who had brought the news we set off at a good pace and found the information to be quite correct, as after an hour's hard walking we came up with a large herd of elephants moving slowly along, feeding as they went. We had the wind of them, but there was very little cover as the grass had been recently burned, and, as a consequence, the leaves had been scorched and had fallen from the small trees and bushes. Bindas, however, who was an expert at elephant hunting, led me up to the herd a little in advance of their line of march, and we waited for them to pass. They walked slowly by and we had to keep as still as death behind a small bush. I am free to confess that I did not like it at all as the great brutes came past, some of them not twenty yards away, and to relieve the tension I wanted to

fire at a bull with medium tusks, but Bindas would not hear of it, saying that this elephant was not half good enough for so distinguished a personage as myself. The herd passed and we ran forward along its flank so as again to lie in wait for it. Of course, with a large herd it is impossible in wooded country to see them all at once, and the method we adopted was the only way by which we could hope to get close enough to make fairly sure of my aim in the event of seeing a tusker worth shooting. A second time those of the herd near us rolled by, but this time we saw what appeared to be a huge tusker, and Bindas whispered to me that this elephant was *abu kulahoom*, "the father of them all." We again went forward and lay in wait, and "the father of them all" was impelled by fate to come to the flank of the herd to feed on the leaves of a large tree about twenty yards from where we were lying behind a bush. We waited for a few tense moments until the elephant turned broadside on, and then I raised my rifle and fired at the tip of his left ear when he carried it laid along his shoulder: this is the guide for the heart shot at an African elephant. On the report of the rifle a babel of trumpetings and squeals burst from the herd; the elephant I had hit raced forward about fifty yards and then pulled up and turned facing in our direction. I was not looking at him particularly, but, after replacing the exploded cartridge in my rifle, was anxiously watching the startled herd to see if it would stampede our way and flatten us out. However, the herd rushed off in the opposite direction, and I ought to have got another fine bull who tore past our place of concealment not thirty yards away, but I thought one was enough, and I had not settled with him yet. When the herd had gone we turned our attention to the bull I had fired at, and almost immediately Bindas got up and shouted "*Ouz yemoot*," "He is dying." I got up too and then saw that the great beast was beginning to sway from side to side; he dropped on his knees, burying both tusks in the ground, and rolled over and, as bad luck would have it, broke about three feet off his right tusk. We ran up to our victim, taking the precaution to approach him from behind. When we got up to him the poor brute made a desperate effort to rise which I quickly put an end to by pithing him with a bullet. We then examined him at our leisure and found that his tusks, although long (they measured seven feet along the outer curve), were not very thick. The next thing to be done was to cut out the tusks, but I decided to have lunch first, and leaving the native who had brought us the news on guard over the dead elephant, Bindas and I walked back to the fort

to get it. It was about midday when we got back to the fort, and very hot. After lunch I returned with some men to cut out the tusks, and on reaching the elephant found it surrounded by about a hundred natives, and parties of them kept continually arriving carrying baskets, earthenware pots, etc., in which to carry away the meat. In the end I should think there were over two hundred men, women, and children, gathered round. It is strange how news carries in Africa. I had no idea that there was anything like this number of natives in the vicinity. I told them that they might have the meat as soon as the tusks were cut out but not before, and then set my men to work cutting them out. It was a long job as we had only a small axe and a chisel, and about three hours were spent in hard work before we succeeded in removing them. I occupied the time in examining the waiting natives for enlarged glands, but found none. While engaged in this duty I noticed my friend of the morning, the sultan, hovering round. He seemed quite well disposed, and after a time became confident, came up, and sat down with the others. I believe that if I had had my hypodermic syringe with me he would this time have allowed me to puncture his glands. When the tusks were removed I gave the word "go" to the natives, and a terrible scramble for the meat took place. In a few minutes they had disembowelled the carcass and were hacking away inside the beast at the fat round the kidneys. It was a sickening sight, and as one of my men expressed it, the natives were *zay mofaieen*, "like hyænas." We got back to the fort just before dark with the ivory, and so ended a day's work with the Sudan Sleeping Sickness Commission.

FURTHER OBSERVATIONS ON THE PRESENCE OF ANTIBODIES FOR *MICROCOCCUS MELITENSIS* IN THE MILK OF ENGLISH COWS.

By Major S. L. CUMMINS, Captain C. J. COPPINGER, and Lieutenant A. L. URQUHART.

Royal Army Medical Corps.

In the Journal of the Royal Army Medical Corps for January, 1914, Major J. C. Kennedy, R.A.M.C., called attention to the fact that the sera of 5 out of 22 English cows examined contained agglutinating substances for *Micrococcus melitensis.* Of the 5 animals giving a positive reaction, the milk of 3 agglutinated the germ in high dilutions, and of these latter the serum of 2 agglutinated in dilutions similar to the milk. Whey obtained from the positive milks was found to be as active as the milks themselves. Neutralization of the milk did not interfere with the reaction. The results of filtration of the milk or whey were variable, but, as a rule, the agglutination was diminished or eliminated in the filtrate. Fleet-Surgeon P. W. Bassett-Smith,[1] C.B., R.N., following up Major Kennedy's observation, examined the milk from a series of cows, but only found one that agglutinated in a dilution as high as 1 in 100. In the case of this cow the agglutinins were not removed by heating to 58° C. for half an hour. All attempts by both observers to cultivate *M. melitensis* from the milk were negative, and we may add, at this point, that our attempts at culture have so far failed. Whether this agglutinating power depends on a previous infection by *M. melitensis* or not, Major Kennedy's observation is of the highest interest and importance. If the phenomenon finally proves to be unconnected with infection by the germ, then the value of the lacto-reaction in the search for infected goats will have to be reconsidered. If, on the other hand, the reaction turns out to imply infection of English cattle with *M. melitensis,* then the question whether some of the continued pyrexias of this country are not to be explained in terms of infected milk will come seriously to the front. It must be recalled that, although previously unknown in England, agglutination of *M. melitensis* by cows' milk had been already noted by Colonel Horrocks in Gibraltar,[2] and has been in

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[1] *Trans. Soc. Trop. Med. and Hyg.*, February and March, 1914, vol. vii, No. 4.

[2] Journal of the Royal Army Medical Corps, 1907, vol. viii, p. 380.

these cases associated with what was almost certainly an infection of the animals with the germ. Staff-Surgeon E. A. Shaw obtained positive agglutinations with the sera of 10 out of 33 cows in Malta, and cultivated *M. melitensis* from the milk of 2 of them.[1] It is therefore certain that cows can be infected with the disease. In view of the importance of the questions at issue, further work is now in progress at the Royal Army Medical College, and it is hoped, sooner or later, to obtain a final answer as to the specificity or otherwise of the reaction. The present paper is merely a report, in some detail, on the milk of one of a series of 7 cows from a London dairy examined for agglutinins. Of these 7 animals 2 gave positive results, and 1 of the latter, Cow 5, was found to agglutinate *M. melitensis* in dilutions varying between 1 in 250 and 1 in 1,000 on different dates. The milk of Cow 5 was accordingly investigated from the point of view of agglutinins, opsonins, and deviating substances.

Agglutinins.

(1) The milk, whey, and blood-serum of Cow 5 all agglutinate the germ to corresponding dilutions.

(2) The agglutinins are demonstrable in the milk when tested almost at once after drawing.

(3) The agglutination does not depend on the presence of acid. The acidity of the milk of this cow varied from 0·128 to 0·162 per cent of acid (calculated as lactic acid), while that of Cow 12, an animal not agglutinating the germ, was as high as 0·174 on one occasion. Michaelis[2] has shown that the agglutination of organisms by acids depends upon the concentration of H ions, there being an optimum concentration for each germ. In attempting to find the optimum concentration for *M. melitensis*, using the series of solutions recommended by Michaelis (*vide* Chart I), it was found that this organism was not agglutinated by any of the series, although a parallel series of tubes to which *Bacillus typhosus* was added showed marked agglutination in tubes III, IV, and V, the optimum being in tube IV. The test was repeated with *M. melitensis*, using normal lactic instead of acetic acid, but the result was negative. It is therefore clear that an acidity many times greater than that of the milk is unable to agglutinate this organism.

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[1] "Report of the Commission on Mediterranean Fever," Part I, March, 1905.

[2] *Deutsche med. Woch.*, 1911, vol. xxxvii, p. 969.

CHART I.—MICHAELIS'S TEST.

	Normal NaOH	Normal acetic acid	Distilled water	Concentration of H ions
	c.c.	c.c.		
Sol. I.	0·5	0·75	8·75	$1 \cdot 10^{-5}$
Sol. II.	0·5	1·0	8·5	$2 \cdot 10^{-5}$
Sol. III.	0·5	1·5	8·0	$4 \cdot 10^{-5}$
Sol. IV.	0·5	2·5	7·0	$8 \cdot 10^{-5}$
Sol. V.	0·5	4·5	5·0	$16 \cdot 10^{-5}$
Sol. VI.	0·5	8·5	1·0	$32 \cdot 10^{-5}$

Bacillus typhosus agglutinated by solutions III, IV, and V.
Micrococcus melitensis not agglutinated by any solution.

(4) The agglutinins are thermostable. The heating of the milk, whey, or serum to 57° C. for twenty-five minutes fails to destroy them. An interesting point is that the optimum concentration of agglutinating substance is shifted to higher dilutions by the process of heating, so that the lower dilutions no longer show complete agglutination, thus producing a "paradoxical reaction" that is not evident in the unheated milk. This is most marked with the blood-serum, but is well seen in the whey also (*vide* Chart II).

CHART II.—SERUM FROM COW 5. AGGLUTININS.

Dilutions →		$\frac{1}{10}$	$\frac{1}{20}$	$\frac{1}{40}$	$\frac{1}{80}$	$\frac{1}{160}$	$\frac{1}{320}$	$\frac{1}{640}$
Serum	Unheated	+ ++	+ ++	++	++	+	+	±
,, ...	Heated	−	±	++	+ ++	+	+	±

Sedimentation for twenty hours.

(5) The milk of Cow 5 has been tested against the following organisms, none of which are agglutinated by it: *B. typhosus*, *B. coli*, *B. dysenteriæ* (both Shiga and Flexner), and *M. paramelitensis*.

(6) The whey, on being kept for three weeks, still agglutinates *M. melitensis* to the same dilution as at first.

(7) Filterability. In one observation the agglutinins were retarded but not eliminated by passage through a Doulton candle, the whey being diluted to one in twelve before filtration. The agglutinins in an immune rabbit serum (kindly given us by Dr. O'Brien of the Wellcome Research Laboratories) diluted to the same degree passed through the filter with no appreciable diminution in titre (*vide* Chart III).

CHART III.

Filtration of agglutinins	Saline dilutions		
	$\frac{1}{24}$	$\frac{1}{120}$	$\frac{1}{600}$
Filtered whey	+ +	+	–
Unfiltered whey	+ + +	+ +	+
Filtered serum	+ + +	+ +	+

N.B.—Both whey and serum were diluted to $\frac{1}{12}$ before filtration. Sedimentation, 20 hours.

The immune rabbit serum, when diluted with whey from Cow 5 instead of with saline, and filtered, still agglutinated to close on its original titre. Attempts to repeat this experiment with immune rabbit serum diluted with whey from a "control" milk (Cow 16) led to a complete elimination of the agglutinins from the serum. These observations will have to be repeated, as individual filters seem to differ in their power of retarding agglutinins.

Opsonins.

(1) The milk, the whey, and the blood-serum of Cow 5 all contain thermostable opsonins for *M. melitensis*, while the milk of "control" non-agglutinating cows has no opsonizing effect. The opsonin is present in large amount and is capable of demonstration in high dilutions (*vide* Chart IV). In estimating the opsonic content of milk for this germ, it is well to use thick emulsions and to employ Klien's method of dilution to an end-point rather than the numerical method of Wright, since the organisms are difficult to count owing to their small size. The films are best stained with carbol thionin or carbol methylene blue, as any stain that brings into prominence the granules of the phagocytes leads to confusion in evaluating the results.

The opsonins are still demonstrable after the whey has been kept for three weeks.

CHART IV.—OPSONINS (THERMOSTABLE).

	Dilutions	Number of cocci per cell
Whey— Cow 5	1—5	+
	1—10	+
	1—20	+
	1—40	+
	1—80	1·46
	1—160	0·9
	1—320	0·54
Milk— Cow 16 (Control)	1—5	0·58
	1—10	0·43

N.B.—Where + is given instead of a number, the phagocyted bacteria were too numerous to be accurately counted.

DEVIATING SUBSTANCES.

(1) We have so far failed to demonstrate the presence of deviating substances in the heated milk or whey of Cow 5.

(2) In one observation, the heated serum of this animal was able completely to deviate two minimum hæmolytic doses of complement up to a dilution of one in sixteen, beyond which the dilutions were not carried (*vide* Chart V). In a second experiment we failed to obtain any deviation, but, in this instance, the heated serum had been kept diluted in saline for several days and the serum of an immunized rabbit, previously positive, also failed to lead to deviation after keeping under the same conditions for the same time. Being surprised that the serum gave a positive result when the whey had persistently failed to do so, we were inclined to attribute this difference to the presence of "complementoids" in the heated whey, these interfering with the junction of the subsequently added complement with the antigen antibody receptors. To test this, we tried diluting the immune rabbit serum with whey from a control milk (Cow 16), but the serum so diluted showed no diminution of its deviating power. Some other explanation must therefore

be sought. In "deviation" tests with *M. melitensis*, a careful standardization of all the reagents is imperative, an emulsion acts better than an extract as "antigen," and thick emulsions have considerable anti-complementary power, a point that must never be lost sight of. The use of a positive as well as a negative control is essential.

CHART V.—DEVIATION TEST.

Dilutions →	Whole	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{16}$
Immune Rabbit Serum	⊙	⊙	⊙	⊙	⊙
Serum, Cow No. 5	◍	◍	⊙	⊙	⊙
Whey, Cow No. 5	●	●	●	●	●
Control Human Serum (S. L. C.)	●	●	●	●	●

●..... No deviation.
◍.... Partial deviation.
⊙.... Complete deviation.

Immune rabbit serum, used as a "positive control," completely deviated two minimum hæmolytic doses of complement in all dilutions to 1 in 16. Normal human serum, the "negative control," gave no deviation in any dilution. The milk of Cow 5 gave negative results; while the heated serum of this cow deviated completely in the higher dilutions, partially in the lower, thus giving results comparable with the agglutination by the heated serum (*vide* Chart II).

CONCLUSION.

The milk, whey, and blood-serum of Cow 5 behave towards *M. melitensis* in a manner comparable to the body-fluids of animals suffering from, or immunized against, this organism, due allowance being made for differences in concentration of "anti-substances" and degrees of immunity.

REPORT ON A SERIES OF EIGHT HUNDRED AND THIRTY-THREE MEDICAL PYREXIAS OCCURRING IN THE SIERRA LEONE GARRISON DURING THE PERIOD OCTOBER 4, 1912, TO OCTOBER 4, 1913, WITH REMARKS ON THE BEARING OF THESE DISEASES ON THE HEALTH OF THE TROOPS.[1]

By Major J. C. B. STATHAM.
Royal Army Medical Corps.

Malaria.

Of a total of 833 medical cases of pyrexia investigated among the garrison of Sierra Leone during the period October 4, 1912, to October 4, 1913, 623, or roughly three-quarters, were proved microscopically to have been malarial in origin. These figures are sufficient to show the overwhelming preponderance of this disease on the West Coast of Africa, and are supported by a collateral investigation carried out among the civil population, where the percentage of sick native children suffering from malaria was higher still—80 per cent—and by a malarial census of apparently healthy native children, carried out by Major A. H. Morris, R.A.M.C., in 1906, which showed about two-thirds of them to harbour malarial parasites in their blood.

The type of parasite found in the 623 cases of malaria was the subtertian in all instances but seven. The absence, practically speaking, of quartan and benign tertian affections in these adult cases is curious, inasmuch as the proportion of these parasites found in the blood of 100 sick native children suffering from malaria amounted to as much as twenty per cent of the total. It is not difficult to understand why the adult African soldier should be free from quartan and benign tertian malarial infection, as it may be assumed that immunity is more readily acquired against these less virulent types of parasites. The similar freedom of the West Indian soldier from such malarial infections may be due to an immunity acquired in Jamaica. I do not see, however, why the European soldier practically never suffers from quartan or benign tertian malaria, for he can have no such immunity, unless, owing to segregation, the source of his malaria is the adult native and

[1] Extract from an Annual Report.

not the child. It is possible that the subtertian parasite of West Africa is somewhat different from that found in Asia for the following reasons :—

(1) The gamete ("crescent") forms are more rarely found than in other countries. Out of 176 cases of malaria one of my predecessors found only six cases in which crescents were present in the blood, although they were specially looked for. In the series of cases under review the proportion is still smaller, but no special search was made for these sexual forms. In the blood of 100 malarial children, crescents were found in five of the cases.

(2) The great difficulty occasionally met with in finding parasites in malarial cases. This difficulty is comprehensible when the immune West African is in question, but in a West Indian or European soldier it is also often encountered, and the parasite is only found after hours or even days of searching, though no quinine may have been taken and periodicity be allowed for. I have had similar difficulty with subtertian malaria in South Africa, but cannot remember such cases in India. This difficulty of demonstrating the parasite may account for some of the cases in the group labelled "probable malaria," though it has to be admitted that in the majority of these cases only one blood examination was carried out. It may also account for some of the cases in the "gastro-intestinal" group, and in the "?" group, where some of the clinical symptoms pointed to malaria, but no parasites could be found.[1]

(3) The third reason for supposing that in West Africa we may be dealing with a different "race" of subtertian parasite is its amenability to quinine. There is a general consensus of opinion, I believe, among medical men on the Coast, that the subtertian type there yields more readily to quinine than the Indian and other subtertian malarias.

It is comparatively easy to distinguish between the temperature charts of (*a*) the West African soldier, (*b*) the West Indian soldier, and (*c*) the European soldier. The febrile curve differs in each of the three cases. In the West African, as a rule, the fever is very short, lasting but one or two days, its briefness being, of course, due to his immunity. The West Indian, on the other hand, reacts to malaria by showing high temperatures, accompanied usually by marked remissions and intermissions. He appears to suffer more severely from malaria than the European

[1] The table to which these remarks refer is not reproduced.

soldier. This is curious, because one would expect a certain degree of immunity in these men, most of whom, having already served a previous term on the coast, must have suffered from malaria. Perhaps ankylostoma infection, which is almost universal among these men, renders them less resistant to malaria. Relapses of malarial fever are frequent among the West Indian soldiers, but unusual in the cases of European troops.

Bilious Remittent Fever of Malarial Origin.—Jaundice, unless looked for, may easily be missed in West Africans and West Indians, owing to the condition of chronic conjunctivitis and pterygium from which they suffer, but I am inclined to believe that malarial bilious remittent fever is uncommon among the troops. I have personally seen only some half a dozen cases where jaundice (slight in all cases but one) was present. Bilious vomiting is more frequently seen. The one case of malaria with marked jaundice died. In this case, which occurred in an alcoholic, besides a very heavy malarial infection, a large fatty and cirrhosed liver was found. The case was peculiarly instructive, firstly because the clinical features simulated those of yellow fever, and secondly it is probable that the heavy mortality caused by malaria in earlier years at Sierra Leone, when the troops were not as temperate as they are now, was due to similar conditions, i.e., malarial infection occurring in men whose resistance had been greatly lowered by cirrhosis of the liver due to alcohol.

Incidence of Malaria.—Taking one year with another, the percentage of malarial attacks is at least five times as great amongst the European troops living on the Signal Hill, Murray Town Battery, as amongst those at Tower Hill.

In the year 1913 the figures were approximately :—

Station	Period	Average strength	Admission
Tower Hill	January to September, 1913 ..	158 ..	43
Signal Hill, Murray Town Battery	,, ,, ,, ..	23 ..	46

This probably much understates the true proportion in favour of Signal Hill, Murray Town Battery.

Blackwater Fever.

This term probably covers a group of pathological conditions which might with advantage be differentiated, and the term "blackwater fever" limited to the cases which are not obviously hæmoglobinuria due to drugs such as quinine, or to the severe blood

destruction in intense malarial infections. Among the seven cases of hæmoglobinuria I came across during the last twelve months, one was a native child, probably a case of malarial hæmoglobinuria. The malarial infection in this case was intense, the blood destruction very great, and the hæmoglobinuria transitory. Of the cases, four in number, among the troops, one might also, I think, be considered malarial hæmoglobinuria, for here, too, the infection was a heavy one and the hæmoglobinuria transient. In two others the hæmoglobinuria was due to drugs. In the first case, that of a West Indian serjeant's son suffering from malaria, it followed soon after the administration of a strong dose of camphor and gin. The hæmoglobinuria was very transitory, and the urine strongly aromatic in odour. In the second case, the blackwater condition was closely associated with the taking of quinine, appearing soon after its exhibition on two separate occasions. When quinine had been taken, and the hæmoglobinuria had developed, no malaria parasites were found in this man's blood, but the patient had suffered from a very severe subtertian infection only a month before. In the fourth case there was a very slight transient hæmoglobinuria in a patient who had suffered frequently from malaria, and in whose blood subtertian parasites had been found only two days before. A fifth case of hæmoglobinuria amongst the troops occurred in a time-expired man who, in Sierra Leone three months before, had suffered from only one attack of fever, which was diagnosed pyrexia of uncertain origin as no malaria parasites could be detected. Before embarkation this man was detained a day in hospital with fever, but there is no record of a blood examination having been made, and he was in hospital on board ship from embarkation onwards.

I found what I considered to be "cell inclusions" in one of the series of the seven blackwater cases.

Trypanosomiasis.

Two cases of this disease have been found among the troops, both occurring in soldiers of the West African Regiment. One case was detected in December, 1912, and the second in June, 1913. After the discovery of the first case some 300 or more blood smears and eleven gland punctures from West African soldiers were examined, with only one positive result, that of the case found in June, 1913. In a search conducted in Freetown and the Protectorate by Major H. W. Grattan, R.A.M.C., when specialist sanitary

officer in 1905, eighteen cases altogether were found; two of these were amongst the troops. Several of the cases were followed up in subsequent years, and some developed "sleeping sickness" and died.

Though "sleeping sickness" was known in Sierra Leone as long ago as 1803, and on the Guinea Coast in 1721, yet it never appears to have been of a severely epidemic character on the West Coast of Africa. The disease, however, when carried by Stanley's Congolese soldiers to Central and East Africa, appears to have set up the severe and fatal form of sleeping sickness now devastating Uganda and some portions of East Africa. There is no reason to suppose that the *T. gambiense* (the type found in Sierra Leone) is not a virulent type of the trypanosome family, as people attacked by it appear finally to succumb, and its pathogenicity to animals is fairly high. There is apparently no reason why the disease should not spread, as *Glossina palpalis*, the selected transmitter of the disease, is present in many parts of the colony, and even close to Freetown. The fact that the disease does not spread may be due to: (1) The immunity of the local population, who have had the disease among them for centuries; (2) the possibility that, after all, the trypanosomiasis found to be present at Sierra Leone is not entirely due to *T. gambiense;* (3) the fact that game, the natural reservoir of trypanosomes, is comparatively scarce in that colony. With regard to the first point, we know that where a disease is endemic it remains so as long as fresh and non-immune human material does not invade its area; but both West Indians and Europeans must frequently have been bitten by *G. palpalis* on Wilberforce Ridge and Aberdeen, yet not one case of trypanosomiasis of local origin is known to have occurred amongst them. With regard to point (2), the discovery in 1910 of a new strain of trypanosome, *T. rhodesiense*, more virulent than *T. gambiense*, and more recently of *T. nigeriense* (?) in 1913, a trypanosome described as morphologically distinct, of low virulence both to men and animals, and causing a mild form of trypanosomiasis in Southern Nigeria, suggests the possibility of the local trypanosome being of yet a different strain. With regard to point (3), it must be remembered, however, that recent research has established *T. gambiense* to be a human, rather than an animal, trypanosome. If then, the trypanosomiasis occurring in Sierra Leone is entirely due to *T. gambiense* the absence of game would have no material bearing on the question of the absence of epidemic sleeping sickness in the Colony.

LEISHMANIASIS.

No cases of infection by Leishmania have been found amongst the troops. In two native civilian cases I have found what may have been Leishman-Donovan bodies in large mononuclear blood cells; but as only one body was found in each case nothing further can be said about them, except that in both these patients the spleens were greatly enlarged and leucopenia was present.

A number of dogs were examined for the presence of *Leishmania infantum*, but with negative results. Large spleens are not infrequent in native children, as might be expected in a malarious country. Enlarged livers are less frequently found.

In one case of Dr. Butler's, a child with pyrexia and enlarged liver and spleen, we discovered in the liver juice curious bodies superficially resembling Koch's granules of East Coast fever. In a second case, similar to this clinically, I found one or two similar bodies in two slides of liver juice examined. The nature of these bodies, which were submitted to Sir W. Leishman, is undetermined.

PAPPATACI FEVER, DENGUE, THREE-DAY FEVER, AND SEVEN-DAY FEVER.

There have been some seventy cases of undiagnosed fever, in which no malaria parasites have been found in the blood. Some of these cases have been so incompletely investigated, from a clinical and laboratory standpoint, that they cannot be satisfactorily discussed. The majority of the remaining cases were, I think, on clinical and bacteriological grounds, cases of malaria in which the parasites had been missed, either owing to a single blood examination only having been made, or to the great scarcity of parasites, a condition which one often notices in subtertian malarial infection on the West Coast. There remain other cases in which the most complete search on successive days failed to reveal malaria parasites, and some of these cases may have belonged to the group of diseases mentioned above.

The sporadic rather than epidemic nature of these cases, and the absence of rashes, conjunctival injection, and joint affections, appear to negative pappataci fever or dengue in epidemic form; but some of the cases may have been of the nature of sporadic dengue, or seven-day fever, if these are clinical entities. Amongst the group of undiagnosed cases have been several with definite gastro-intestinal symptoms. I would prefer to defer any opinion on this group of cases until I have had more time to study them.

Though simulidæ and cheironomidæ abound in Sierra Leone, I have never met with or heard of the *Phlebotomus papatassii*.

Yellow Fever.

This disease appears in such protean forms in mild cases that it seems impossible to say that it has not been met with and remained unrecognized. The only case with clinical features at all resembling yellow fever was the one already mentioned in whose blood and organs large numbers of subtertian parasites were found. This was considered to be a case of bilious remittent malaria, with cerebral symptoms and complicated with cirrhosis of the liver.

Typhoid and Paratyphoid Fevers.

There has been one case of typhoid fever in which the typhoid bacillus was isolated from the urine, and marked agglutination reactions against *Bacillus typhosus* were obtained. As the patient was a sailor on a German cruiser, it is not certain that the case was contracted on the Coast. There have been two cases among West African soldiers with typhoid symptoms. Blood cultures were made in both cases, but as the culture flasks had to be carried along a rough road for a long distance and were much shaken up, pure cultures were not obtained in either case. From both cases Gram-negative, motile organisms, giving rise to the production of acid in lactose, and acid and gas in glucose, maltose, and sucrose, were obtained. The micro-organism isolated from the first case did not agglutinate with the patient's serum, and the one from the second case only to the extent of a one-twentieth dilution in one hour. I am convinced, notwithstanding these results, that typhoid fever will be proved to exist amongst the West African natives, though probably to a less extent than found amongst the natives in India.

Agchylostomiasis.

The ova of these worms have been found in twenty-eight cases of pyrexia during the year, and in nearly all (twenty-one) of these cases agchylostomiasis was the only discoverable cause of the pyrexia. In others the fever was partly accounted for by malaria. Twenty-one of the cases were among the West Indian troops and seven among the West Africans. One of my predecessors found that 56 per cent of the men of the West India Regiment admitted to hospital were harbouring agchylostomes. No cases of agchylostoma infection have been found among European troops.

It is now generally considered that much of the agchylostoma fever is due to a secondary infection by intestinal bacteria acting on an intestine injured by these hook-worms. This does not, however, alter the serious nature of the original infection. The type of fever met with in the West Indian is usually the prolonged intermittent. Thymol treatment has not been successful.

The Bearing of these Notes on the Health of the Troops, with some Sanitary Recommendations.

Mount Aureol and the Health of the West Indian Troops.—Nine out of ten cases of medical pyrexia at Mount Aureol are due to malaria, the attacks are typical clinically, and in practically every case the parasites are demonstrable: the tenth case will, as a rule, be one of agchylostoma fever.

The agchylostoma question may be briefly dismissed. The West Indian soldier brings the disease with him from Jamaica. Half of the regiment is probably affected. Most of the cases are slight and do not interfere seriously with the men's work—in peace. Treatment seems almost hopeless, and the severe cases are better invalided out of the service.

Malarial fever is the only fever of moment to Mount Aureol and the West Indian soldier. Situated as the barracks are on a steep wind-swept spur, and a half to one mile from the nearest native huts, Mount Aureol should show the lowest sick-rate from this disease amongst the garrison. As a fact, however, the West Indian soldier suffers from malaria more than even the European. The reasons for this are, I think, as follows:—

(1) The anopheles mosquito, *Myzomyia funesta*, is present in the neighbouring Kortright water catchment area.

(2) The West Indian soldier seems to spend a great many of his evenings and nights in Freetown.

(3) The windy and colder climate of Mount Aureol seems to set up chills in these men who are unsuited to it. The arrival at dawn on the hill after a sweaty march up the steep rise from the town is very likely to cause such a chill and a malarial relapse.

(4) The reinfections and relapses maintain the human reservoir and enable the anopheles continually to disseminate the infection.

What are the Remedies?—It would be extremely difficult, if not impossible, to deal with the first condition. There are a few *Myzomyia funesta* breeding in the brook, but more frequently in inaccessible tree and rock holes in the dense bush forest that

protects the Kortright water catchment area and the water supply of Tower Hill. These conditions cannot be materially altered without great expense, and without endangering the pure water supply of the European soldiers. We are thus left to deal with the second, the human factor, in the spread of malaria at Mount Aureol.

I believe that a great diminution in the disease in the West Indian soldier could be brought about by dealing with the human factor. The question of allowing the men into Freetown at night, with the danger of infection while there and relapse due to chill while returning, and the question of the more careful use of mosquito nets, rests with the regimental authorities. The prevention of malaria carriers and a more prolonged treatment with quinine concern the medical officers on the hill.

Tower Hill and the European Troops.—Tower Hill remains now as ever anopheles-free and the healthiest of the three cantonments; moreover, what chance there might be of infection from the mosquitoes in the town round the base of the hill is steadily diminishing yearly owing to more energetic sanitary methods. The high percentage of malarial fevers amongst white troops is largely due to infections contracted on the Wilberforce Ridge (Signal Hill, Murray Town Battery, and Murray Town Point). The dangers to health of garrisoning this mosquito and tsetse-fly infected ridge is so great that I believe the European malaria rate would be nearly halved if these outposts were garrisoned by West African soldiers during the unhealthy months of the year. The system of admitting all European soldiers suffering from malaria to hospital, and keeping them there for long periods, first as in-patients, and later as out-patients, under quinine, is responsible, I think, for the fact that relapses amongst them are comparatively rare.

Wilberforce Cantonments and the West African Regiment.—Wherever he might be the West African soldier would not suffer much from malaria, and the malarial admissions from these troops are low, as might be expected. European officers and non-commissioned officers are protected from the native lines by a wide clearing. This is, of course, a necessity, knowing as we do that probably two-thirds of the children there are reservoirs of infection and that anophelines are more readily found in Wilberforce than in any of the other cantonments.

The wind-swept ridge on which the officers' lines are built appears to protect them fairly well from malaria.

United Services Medical Society.

THE TRANSPORT OF WOUNDED IN WAR.

By Major A. J. HULL.
Royal Army Medical Corps.

In the future the employment of motor transport and the more scientific treatment of the wounded will revolutionize the evacuation and transport of casualties. The wounded of divisions will probably be dispatched to the base with a rapidity unknown in past campaigns.

The transport of wounded may be studied from the surgical and from the administrative points of view. From the surgical point of view advances have been made during the last few years which will render justifiable more rapid methods of transport and will minimize its injurious effects. The introduction of mechanical vehicles will not only benefit the wounded by providing greater facilities for swift transport, but will render armies of the future less encumbered by wounded and therefore more mobile than they have ever been in the past.

There is only one place of choice at which a man can be surgically treated and that is at a general hospital. Circumstances may arise which may make it imperative that a man should be treated at any situation on the field, but a general hospital is the place of choice.

Wounded may be divided into cases which can be returned to the firing line after treatment at one of the medical units, and cases which cannot return to the fighting line for some indefinite period. The latter class includes operation cases, fractures, and lying-down cases; and the majority of these are lost to the campaign. The former class contains the cases of military interest, and every endeavour will be made to include every possible sick man in that class. The cases of this class require no transport beyond the clearing hospital or railhead. The cases in the second class cannot return to the fight for an indefinite period and they should be transported to the base as quickly as possible. Speed is what is required, not only in the interest of the patients, but of the army in the field. The days of slow transport are over and the fear of inflicting injury upon the wounded by fast transport may be dismissed. I need not take up time by discussing the

importance of ridding divisions of their sick, as this subject has already been presented to the Society by Colonel Skinner in his paper "The Crux of the Medical Problem in War."

We are always accustomed to assume that transport is bad for wounded. It is necessary to inquire why it is bad, we can then find a remedy for the evil. The evil effects of transport may be due to shock, fatigue, want of sleep, cold, hunger, thirst, pain, and various clinical manifestations, such as hæmorrhage, vomiting, and retention of urine. These injurious results can either be minimized or removed by appropriate treatment. Shock is increased by any movement or vibration owing to reflex action set up by irritation of the injured part. We can in a large measure combat shock by suitable dressing and immobilization of injured parts. By the injection of quinine bimurate carbamide around a wound or at the site of operation, anæsthesia may be produced which will be maintained for three days, minimizing the shock of transport.

Nerve trunks may be injected with eucaine, by which means pain will be relieved and afferent stimuli cut off. The intraspinal injection of stovaine is invaluable as an anæsthetic for cases in which the shock of an operation is to be feared. Such cases will suffer less from shock after operation and will bear transport well. Fatigue and want of sleep must be combated by suitable feeding, the administration of stimulants and morphia. The greater the speed with which the wounded are dispatched the less they will suffer from these conditions. Unless patients can be kept warm during transport the loss of life will be great. It is impossible to lay too much stress on this point, the maintenance of adequate warmth is essential; patients who have been treated by morphia or alcohol are particularly liable to suffer from cold. Shock is increased in an alarming degree by allowing a patient to suffer from cold. Suitable covering by blankets, etc., is absolutely necessary, and some form of "overlay" or thin mattress is essential for stretchers. The cold striking up through the canvas is bad even for a healthy man. For seriously wounded men a covering of blankets, a stretcher mattress, and artificial heat are necessary. The artificial heat can be provided by hot-water bottles.

The Preparation of Fractures for Transport.

An absolutely immobile limb; the ends of the fractured bone held firmly apart; a splint so adjusted that it will carry the patient's weight without the lines of force going through the fractured bone—

these are the essentials for the perfect treatment of fractures. They can only be obtained by the application of a plaster splint.

A patient treated by wooden or metal splints will require constant attention during transport. Time will be wasted at every halting place in adjusting and reapplying such splints. Plaster splints require the simplest apparatus for their application. There is no need to carry a variety of splints. Some plaster of Paris, flannel, and bandages are all that is necessary for their application. They are particularly indicated in cases of fracture of the femur and fractures of both bones of the leg. The earlier in the stage of transport at which severe fractures can be permanently put up in plaster the better. The tent division of a field ambulance is the ideal spot at which to treat these injuries. If extreme rapidity is necessary owing to the speedy clearing of a field ambulance, the best temporary splint which can be put on most quickly is a long Liston splint with a foot-piece, applied to the posterior aspect of the leg, counter extension being obtained by means of a waist belt and perineal bands. This apparatus will be found suitable for fractures of the femur and fractures of both bones of the leg, the only fractures which cause serious difficulty of transport.

By the application of plaster splints I do not mean only the application of the old-fashioned Croft and Bavarian splints but also plaster splints of various modern types. Anterior and posterior splints may be fashioned of plaster and applied by a plaster bandage. Any wound which may be present can be left exposed for dressings.

I would not recommend the dressing of compound fractures with highly powerful antiseptics such as double cyanide gauze, but would suggest that portable sterilizers be added to the field ambulance equipment and that sterile dressings should be applied after the wounds have been painted with tincture of iodine.

Whatever may be the merits or demerits of immediate removal of fractures we must prepare them for transport. Well applied plaster splints, stiffened by aluminium or other metal rods, will enable a patient to travel in comfort immediately after the treatment of the fracture.

Transport of the Field Ambulance.

The transport of the field ambulance, strictly speaking, forms part of the rescue of the wounded. The stretcher upon which a man is first placed should carry him to the base, an exchange

of stretchers taking place at the various units. Fresh supplies of stretchers should be brought up by the ambulance trains. In this manner the wounded would be saved a great deal of discomfort and the personnel a great deal of unnecessary work.

Transport to the tent division of a field ambulance will be by slow horse-drawn wagons. The patients will only have received first aid treatment and in many cases will have been waiting many hours before rescue. Food and warmth should be provided during the journey. Wagons should be provided with hot-water apparatus for filling water bottles and for preparing food.

The substitution of motor ambulance wagons for the horse-drawn vehicles would appear to be desirable, and this would in addition render possible the rapid rescue of wounded. These wagons would be available for the evacuation of wounded, and the difficult problem of how to clear the field ambulances would be solved.

Transport from the Field Ambulance to the Clearing Hospital.

The wounded of the field ambulances can be conveyed to the clearing hospital by field ambulance transport, by divisional transport, or by transport obtained from the lines of communication.

The only ambulance wagons available will be such as the assistant director of medical services has been able to hold in reserve. If the field ambulance wagons were motor vehicles the solution of the difficulty would be easy. The field ambulance wagons would clear the collecting zone and convey the sick to the clearing hospital.

In the present circumstances, if a big battle is anticipated the clearing hospital might obtain transport in advance from the lines of communication, and having ascertained from the assistant director of medical services of the division information as to the location of the field ambulances might send forward the transport to clear them.

What probably would happen in a big action would be that the field ambulance reserves would be expended and the wagon horses exhausted. The divisional transport would not be available. The clearing hospital not being a divisional unit would probably not know the whereabouts of the field ambulance, and would probably not have made previous arrangements for transport. After much delay transport for the clearing of the field ambulances would be obtained from the lines of communication.

In exceptional circumstances the returning Army Service Corps lorries might evacuate the casualties. In this case the wounded in all probability would never see the clearing hospital. The supply column would not deviate, and the sick would be taken direct to railhead.

Delay in the evacuation of casualties is more serious the nearer to the front the congestion occurs. Congestion at the field ambulance is more dangerous in every respect than delay at the clearing hospital. It is between the field ambulances and the clearing hospital that the delay will occur, which probably will only be prevented by replacing either the ambulance wagons or the general service wagons of a field ambulance by mechanical vehicles.

Transport from the Clearing Hospital to Railhead.

If the clearing hospital is not situated on a railway the transport will probably be by motor-lorries. The inspector-general of communications is responsible for evacuating wounded from the clearing hospital. If he can requisition transport locally he will probably do so, and will not interfere with his supply column unless it is unavoidable; as a rule there will be no transport left in the area.

Transport may become available in several ways. In the event of a division resting with its tail on the railhead it may not require a supply column. The lorries of this column will become available for the evacuation of wounded. In the event of a battle lasting several days the men will live on their iron rations, and the supply column will be available for the evacuation of wounded. There is a reserve park of horse transport on the lines of communication which carries two days' rations and two days' forage for the whole force. This transport would probably be available.

If the field ambulances could be cleared rapidly the problem of transport would be easily solved. The difficulty is to provide adequate transport in touch with the field ambulances.

In addition to the several ways of evacuating clearing hospitals mentioned many others would in various circumstances be applicable.

During a great campaign philanthropists would almost certainly present motor ambulance wagons to the army. Fleets of motor-omnibuses or similar vehicles would probably be converted into ambulance wagons and presented. These vehicles would in all

probability be placed at the disposal of the inspector-general of communications. They would render excellent service in evacuating clearing hospitals and the lines of communication, but the problem of rapidly clearing the field ambulances remains as it was before.

The Utilization of Supply Column Lorries of the Army Service Corps for the Transport of Wounded.

In the future one of the features of war will be the rapid evacuation of large numbers of wounded. The army cannot be impeded by the congestion of wounded at the front. The utilization of Army Service Corps lorries which are returning empty has therefore been contemplated. As a matter of fact, this method of evacuating the sick is not by any means a new one, having been in use since the days of Julius Cæsar. The lorries must return empty from the front to the railhead, what could be more rational than that these lorries should be filled with wounded?

Objections have been raised to the scheme by both the medical and supply services, but these would all be dismissed if wounded required transport and the force required to be freed from impedimenta.

The most serious objection is that the wounded can only be loaded at a point which will be chosen for transport reasons and may not be suitable for the loading of wounded. Wounded may therefore have to be carried long distances in order to fall in with the transport arrangements. The supply column cannot be delayed and sufficient time may not be available for the loading of wounded.

The washing and preparing of the lorries after the carrying of wounded will cause difficulty. It will have to be done at night and in a very short time. There will probably be no one available to do the work.

The following facts must be borne in mind :—

(1) The wounded cannot be collected by the supply column; they must be conveyed to one of the definite depots of the column.

(2) The supply column must not be delayed.

(3) The motor lorries will not go to the clearing hospital unless it is on their line.

(4) The column does not return to the rendezvous on its return journey.

(5) The supply column cannot be deflected.

The utilization of the supply column will differ materially in two cases :—

(*A*) If a clearing hospital is employed.

(*B*) If a clearing hospital is not opened.

The clearing hospital is an adjunct to the transport and evacuation of the wounded and not an essential. If the distance is short and wounded can be dispatched to the railhead direct, a clearing hospital will not be opened, and its personnel will be available to aid the evacuation of the field ambulances. The principal function of a clearing hospital is to render the field ambulances mobile by clearing them of their sick.

(*A*) A clearing hospital must not be used for the sake of ritual, but because the relative positions of the field ambulances and the stationary hospitals render an intermediate clearing station absolutely necessary. The employment of the supply column for the conveyance of sick to the clearing hospital is practically impossible. In order to do so it would be necessary: (1) To place the wounded at the refilling point. (2) To know beforehand the return route of the supply column and place a clearing hospital on this route. Moreover, if it were possible to clear the field ambulances by the supply column it would be unnecessary to use a clearing hospital, and better to allow the sick to be carried direct to railhead.

The function of the supply column in the case in which the clearing hospital is opened resolves itself into the clearing of the clearing hospital by the supply column. This will only be possible if the clearing hospital is at the refilling point.

(*B*) When a clearing hospital is not opened the field ambulances must place the sick at the refilling point. The lorries will be loaded at this point and will proceed direct to railhead.

If the supply column is to be utilized the key to the situation would appear to be to place the tent division of the field ambulance at the refilling point, and employ the personnel of the clearing hospital, if they can be obtained, for the laborious work of classifying the wounded into groups and loading the supply lorries, the clearing hospital remaining unopened.

The Choice of Position in the Medical Organization for the Performance of Surgical Operations.

Elaborate instructions as to where definite surgical operations should be performed, such as are framed by some Powers, appear to be unnecessary and only likely to hamper the surgeons. Certain general principles will be sufficient guidance.

The theatre of war may be divided into three surgical zones:

the zone of first aid; the zone of preparation for transport; the zone of orthodox surgical treatment.

The zone of first aid will only be concerned with the application of first field dressings, the temporary treatment of hæmorrhage, and the treatment of fractures.

The zone of preparation for transport commences at the tent subdivision of a field ambulance and ends at a general hospital. The operations which normally may be anticipated in this area are operations undertaken in order to prepare the patient for transport.

In the tent division of a field ambulance the treatment of fractures, preferably by plaster, the ligature of blood-vessels, and rarely amputations may be anticipated. Operations for the relief of intracranial pressure, for the relief of hæmothorax, and for the relief of genito-urinary injuries may be necessary. Exceptionally, if transport to the base is abnormally slow and difficult abdominal operations may be required. Again, exceptionally, a field ambulance may become temporarily a stationary unit, in which case any operation in general surgery may be required.

The scope of operations in the clearing hospital will be very much the same as in the field ambulance, i.e., operations devoted towards facilitating transport. The number and the scope of the operations will depend upon the time which has been available for treatment at the field ambulance.

For practical purposes, if the transport arrangements are working well, the units in front of the base and stationary hospitals may be regarded as depots for the temporary treatment of wounded, and the surgical operations will usually be confined to the treatment of fractures and operations for the arrest of hæmorrhage.

DISCUSSION.

Surgeon-General H. R. WHITEHEAD, in commenting on Major Hull's paper, said that he supposed when the writer of the paper spoke about increasing the speed of the vehicles conveying the casualties, he was referring only to European warfare, as in India, with expeditions on the frontier, it was evident that at present we could only rely on slow moving transport such as dandies, ponies, and camels. He related how in the last Mohmand expedition the ordinary pack camels had been largely used to transport the milder cases to the base and had proved very useful. With regard to the suggestion of carrying mattresses for the severely wounded for use with the stretchers, he was afraid that even in European warfare such things were out of the question, because

of the difficulties of transport. Hay and straw, on the other hand, were often at hand; they were warm and resilient and eminently practical. With regard to the long back splint with foot-piece which Major Hull wanted, it was not in our field equipment and it was a pity to try and introduce new apparatus. The long Liston was in general use, and was a good splint in his opinion. He thought that Major Hull took an unnecessarily gloomy view of the clearing hospital. If there was no transport available for it, of course the problem of evacuating the wounded would be a difficult one, but then he thought that the I.G.C. would always be looking ahead and would have suitable motor transport "ear-marked" for use. Eight motor-lorries would be required for the equipment of the clearing hospital if tents were taken, if not the number could be reduced by three lorries; five lorries were required for the personnel, their baggage, etc., and one for officers and their baggage, making a total of fourteen if tents were taken, or eleven if these were not taken. He quite agreed with what Major Hull had said about the use of the supply column lorries; these could not be deflected, nor could they pick up wounded. He knew that the Army Service Corps were doubtful about the possibility of our using them to the extent we should require. He thought that a very important point was how we were to get our wounded from the field ambulances to the refilling points and to the clearing hospitals. The ambulance wagons must be kept with the fighting force, and should not be sent back if this could possibly be avoided. On the whole he thought that Major Hull's axioms were very sound.

Surgeon-General W. G. Macpherson, said that as he had been for some time out of touch with the ideas which prevailed now at home on the subject of Major Hull's paper he had come to listen to the discussion more with a view to obtaining information than to taking part in it. But he would like to say how thoroughly he endorsed Surgeon-General Whitehead's criticism in laying stress on the point that field ambulances must not add unnecessarily to their equipment. Such things as mattresses and hot-water bottles must be sought for amongst local resources as far as possible. One could not emphasize too much the need of studying local resources in connexion with the transport of sick and wounded. With regard to the suggested abandonment of antiseptic dressings, he pointed out that in the Russo-Japanese War the Japanese used aseptic dressings only, after the wounded reached the field hospitals, with the result that the dressings frequently became infected with maggots during transport down the line of communication. Antiseptic dressings should not, therefore, be lightly abandoned, when wounded have to make long journeys to the base. Journeys in warfare such as that on the Indian frontier would not be so rapid as Major Hull's paper led one to suppose. Major Hull's remarks about the clearing hospital seemed to him wrong in principle. The clearing

hospital was essential in our organization and was, in fact, the pivot upon which the removal of sick and wounded turned. As Surgeon-General Whitehead had remarked, the clearing hospital must be at the point where it was most needed, and this was a matter of administration and co-ordination of the divisional and line of communication services. He would also like to point out that the divisional supply column was not a divisional unit at all, but was a line of communication unit, and consequently the co-ordination of the work of a clearing hospital with the return of empty supply column vehicles would come under the same command and therefore be easy. This is clearly laid down in Field Service Regulations.[1] He did not anticipate, therefore, any great difficulty in clearing the field ambulances of their wounded because of friction or failure to obtain the services of empty supply vehicles. There is no reason, however, why the clearing hospitals should not send a detachment with locally collected transport, such as motor-cars, omnibuses, or other vehicles, up to the rendezvous or refilling points of the supply columns, or other selected places in touch with the field ambulance, and thus form a link with the field ambulance and railhead. Field ambulance transport, as laid down in Field Service Regulations, should not be sent further back with wounded than would enable it to rejoin the unit the same day; and the refilling points would therefore be the probable place at which this transport would transfer its wounded to clearing hospital or supply column transport. A tent division or subdivision of a field ambulance under divisional orders, or a rest station party of a clearing hospital under line of communication orders, would normally be left at these points, to receive wounded and transfer them from one stage to the other of their journey towards railhead.

Surgeon-General May, R.N., said that no reference had been made by Major Hull to ambulance trains, possibly for the reason that time did not admit of his doing so. All the speakers on this subject had stopped short when they had got their wounded as far as the railhead. He was most interested in the subject of ambulance trains, and he particularly wanted information on the subject of how ordinary trains should be fitted up as emergency ambulance trains. He also wanted to know whether it was intended to use proper ambulance trains with the expeditionary force, or whether such trains would be improvised when abroad. He also wanted to know when the wounded were landed in England, whether they should insist on having properly fitted ambulance trains for them or whether they should be content with improvised ones.

Colonel M. W. O'Keeffe said that, in his opinion, the great difficulty would be the carriage of the wounded from the dressing stations to the tent divisions of the field ambulances. He thought that it would be

[1] Part II, Section 52.

impossible to deal properly with the wounded with the present horsed ambulance wagons. In his opinion, motor ambulance wagons were essential, and each section of a field ambulance should be given one motor wagon. He said that this was a most important matter, and that with our present transport we could not deal with the wounded properly.

Major J. V. Forrest, R.A.M.C., said that it was interesting to compare the French view of this matter of the clearing of the battlefield with our own view. The opinion in France was that it was not possible to clear a battlefield at once after an action. Severely wounded must remain in the battlefield area. In the French organization there were eight field ambulances to each army corps. These field ambulances were opened for the reception of wounded during an action as necessity arose. At the end of an engagement, the P.M.O., with a knowledge of the approximate number of casualties, and knowing where the ambulances were opened, would decide how many of these units were to be immobilized, that is to say, turned into temporary hospitals on the field. The field ambulances were equipped as large dressing stations, and to turn those which had become immobilized into temporary hospitals the P.M.O. would order up to each of them a small unit known as a *section d'hospitalisation.* This unit consisted of four men with three wagon loads of blankets, palliasses, shirts, cooking-pots, feeding utensils, dressings, splints, food, etc., which thus supplemented the equipment of the ambulances. In deciding which field ambulances he would immobilize, the P.M.O. would choose those which had opened in large country houses, factories or villages with the most local resources. Other ambulances, not immobilized, would be ordered to send their cases unfit for evacuation to the nearest immobilized field ambulance. At the *gare régulatrice* each army corps had a reserve of eight ambulances and six *sections d'hospitalisation*, and a corresponding number of these would be sent up to the field army to take the place of the immobilized units, the transport of the latter being handed over to the units sent forward. Large numbers of wounded unfit to travel would thus be temporarily accommodated in the battlefield area until they were fit to be moved. Arrangements would be made to relieve the personnel and equipment of the immobilized units as soon as possible by the voluntary aid societies.

Major Waggett, R.A.M.C. (T.F.), said that lately he had had an opportunity of hearing the views of a well-known Army Service Corps officer on the question of using the motor-lorries of the supply column for the carriage of wounded. This officer had told him that the lorries would be far too busy carrying rations for the troops to give time to the transport of wounded. In Major Waggett's opinion, unless these lorries were "ear-marked" beforehand, they would not be available for the carriage of the wounded.

Major S. L. Cummins, R.A.M.C., said that he congratulated Major

Hull on his high ideals. Of course, on the frontier of India and in the Sudan one had to improvise to a great extent, but when it came to warfare in Europe he thought that this ought not to be necessary to the same extent. There was another point that he thought should be gone into, and that was how the severely wounded were to be loaded into wagons at the refilling point. Quite 60 per cent of the wounded after an action were not *severely* wounded, and these men if properly controlled and placed under proper authority might be of the greatest service to us in helping to load wagons. It was essential that these slightly wounded men should be under proper discipline, as otherwise instead of being a help they would be a great hindrance to us. He did not think it possible to find sufficient R.A.M.C. personnel for loading the wagons at the refilling point, because medical units would be busily engaged elsewhere. He suggested that retired combatant officers might be usefully employed at the refilling points in the capacity of keeping discipline among the slightly wounded.

Lieutenant-Colonel Salisbury Sharpe, R.A.M.C. (T.F.), said that there would be no difficulty in adapting the modern train with corridor carriages to make good ambulance trains at a small cost.

Colonel B. M. Skinner, M.V.O. (the President), in closing the discussion, said that he thought Major Hull had a high standard in view, and that he opened up great possibilities. In his opinion Major Hull's axioms were sound. Major Forrest had given us a picture of a situation in a foreign country which would never be allowed by the British public. It was essential for us to get rid of the wounded from the area of the field of battle and they must be got into real, not sketchy, hospitals. He knew that the use of motor lorries, belonging to the Army Service Corps, for the carriage of the sick and wounded, would never be a popular measure with that corps. He was of opinion that the Army Service Corps would never hand over their motor lorries to us, as they would require them for the supplies of the army. He thought that clearing hospitals should be linked with the front by means of an ambulance transport column.

Major Hull, in reply, said that his paper was not intended to apply to warfare outside Europe. He knew very well that there were conditions where hand carriage of the wounded was the only possible method. With regard to Surgeon-General Whitehead's criticism about the impossibility of supplying mattresses, he said that he had used the word "overlay." All he meant was a something which could be put over the stretcher and which would keep the wounded man warm. He must insist on the point that wounded men should be kept warm. These "overlays" need not be bulky things, and no very large number of them would be wanted as they would only be used for the very serious cases. He did not even insist that they should be sent out with the troops, they could usually be improvised. With regard to Surgeon-General

Macpherson's criticisms, he said that when he mentioned hot-water bottles he did not necessarily mean india-rubber hot-water bottles as used in hospitals; all he meant was that the man's own water bottle should be filled with hot water and used as a hot-water bottle. With regard to the long back splint and foot-piece, and the plaster which he was told he could not have as it was not in the equipment and was too heavy, all he could say was that he would willingly dispense with some other articles which were in the present equipment in exchange for the things he wanted. For instance, he thought that he could do without the aluminium splint material. With regard to Surgeon-General Whitehead's remarks concerning the treatment of fractured thighs, one authority recommended that such cases should be left in a stationary hospital for three weeks; another said that the proper way to treat them was to erect a tent over them as they lay on the battlefield. If one studied skiagrams of actual cases of fractures which had occurred in action treated by the methods advocated by Surgeon-General Whitehead and at present in general use, one was not at all surprised at suggestions of impossible treatment such as the above. With regard to his remarks on the clearing hospital he really thought that he had been misunderstood. He had not meant to suggest that the clearing hospital should be dispensed with. He had quoted a very special case, one in which the returning lorries of the Army Service Corps supply column were utilized, and said that the clearing hospital must not be used as a ritual. He still thought there were occasions when it might not be wanted. With regard to the antiseptic dressings he was glad to be corrected in the matter. He had, however, insisted on the use of iodine in addition to plain sterilized gauze. He thought that there was here an opportunity for the bacteriological department to invent an antiseptic dressing of sufficient strength to inhibit flies and yet mild enough to be quite non-irritating to the patient's tissues. He had quite expected to be criticized over his suggestion that motor ambulance wagons were a necessity. He was glad to find that so many agreed with him. He knew that objections were held by many to such vehicles marching with the troops. It had been said that they moved too fast to go with marching men, that the exhaust gases were injurious to the troops. Of course, there was the question of expense. He calculated that the cost of a motor ambulance wagon was about double that of the present wagon with its harness and horses, but that, on the other hand, it would do quite ten times the work. In answer to Major Cummins's suggestion, that the slightly wounded should be made to load the lying-down cases into the motor-lorries at the refilling points, he would like to point out that loading patients on to lorries was very hard work, and that in his opinion men who were fit for that were fit to go back to the ranks.

Clinical and other Notes.

BERIBERI OR POLYNEURITIS AMONG BRITISH TROOPS IN INDIA.

By Colonel F. SMITH, D.S.O.
Royal Army Medical Corps.

In the Journal of the Royal Army Medical Corps for February, 1913, are some notes by Captain Hastings and myself on multiple neuritis among soldiers in Bengal up to and including 1912. It was shown that the sequence of events indicated that neuritis is a place disease, and that it is moreover a disease which may be carried from place to place by infected individuals. Further data are now available. In 1913 there have been only three cases in Calcutta. But an important fact bearing on the place theory has come to light at Lebong since the above-mentioned paper was written. Though not directly my concern there can be no harm in my mentioning it here; for the fact is public in that it has become the subject of discussions which are published in the local Press. Lebong, in the Darjeeling Hills, it will be remembered had been the worst affected of the military stations in the Bengal Presidency Brigade. The interesting fact then is that after the affected regiment was in ordinary course transferred from Lebong to another station, and a fresh regiment had taken its place in Lebong, the disease again appeared in Lebong—the new regiment having been attacked by multiple neuritis in the year 1913.

The following extract from *The Statesman* of January 21, 1914, gives an account of a short discussion on this subject at the All India Sanitary Conference at Lucknow:—

"The Sanitary Conference.

"*Notification of Diseases.*

"The next subject was the notification of diseases.

"Surgeon-General Sir Pardey Lukis remarked that as Dr. De Mello had gone into the subject of beriberi at some length in his paper on the notification of diseases, and had adduced evidence that the disease was of an infectious nature, this somewhat vexed question might profitably be discussed by the Conference, although beriberi did not appear in the agenda. He referred to a recent outbreak of beriberi among the British troops in Lebong, none of whom were rice-eaters, and most of whom were teetotallers.

"Dr. Bose, in introducing his paper, strongly advocated the compulsory notification of infectious diseases. He thought that beriberi was contagious, and quoted in support of his belief a case from the Alipore reformatory.

"Major Greig criticized that portion of Dr. De Mello's paper which dealt with beriberi. He pointed out that rice is an important factor, but its consumption was not essential to the causation of the disease. Any dietary, provided that it is deficient in certain essential constituents, is capable of producing beriberi. He quoted an outbreak in a school in Kurseong, where the boys attacked had fed on a mixed diet, including beef of an inferior quality. Beriberi then is a deficiency disease, and can be best dealt with on these lines.

"Major Clemesha referred to the epidemic in Kurseong, and stated that the dieting there had no doubt been deficient. The head master there now weighed boys every three or four months. He thought that such weighing was very valuable as a test of good dietary. It was desirable, in his opinion, to make beriberi a notifiable disease.

"Dr. Brahmachari supported the dietary origin of beriberi.

"Major Greig, in reply to a question, stated that beriberi had occurred in the past in Germany, England and other European countries.

"Dr. De Mello considered that the deficiency theory could not possibly explain the epidemics of beriberi that had occurred in Goa, and he adhered to the attitude he had taken up in his paper that beriberi was an infectious disease."

Some of the participants in the discussion seem to be flogging a dead horse as regards the diet theory in its application to multiple neuritis or beriberi in general. Apart from the certainty that the British soldier gets a sufficient diet, there is a factor in this particular case which is absolutely fatal to the idea of food deficiency as its cause, and that is that stations in the Brigade which are supplied with the same rations and from the same sources are not equally affected, and some have not been affected at all.

Lebong, where the greatest number of cases have occurred, is in the hills—a health resort to which men whose vitality has been lowered by residence in the hot plains are sent to recover their strength. The neuritis, however, does not occur among these invalids particularly, but among the men in the regiment which has its permanent quarters at Lebong. At Jalapahar, a military station at Darjeeling, a couple of miles or so from Lebong and at a greater altitude, there has been practically no neuritis. Kurseong, a place referred to in the discussion as the seat of an epidemic in a school, is a civil station in the same group of hills as Lebong, but not quite as high.

In by far the greater number of military stations in India multiple neuritis in the epidemic form is never met with among the troops. Good living probably fortifies the men against neuritis as against some other diseases, and this may account for the apparently good effect which followed the introduction of improved dietaries in the Singapore jail and in the Japanese Navy. But neither the Singapore jail nor the Japanese Navy have got completely rid of neuritis, and we are told that during the

Russo-Japanese War the Army of Japan suffered very severely indeed from that illness—the deaths running into thousands.

I recall that years ago, when I happened to be in Singapore, the tendency was to ascribe multiple neuritis in Europeans to alcohol; whereas the hospitals were full of Chinamen, Malays, and Javanese suffering from beriberi—the diet theory was then at its height, and it is taking a long time to die.

The real cause remains to be discovered. An insect carrier seems most likely. Manson has suggested the cockroach or the bug. He may be on the right track. But it is rash to speculate in this field.

THE REMOVAL OF SICK AND WOUNDED IN MOTOR-LORRIES: A WARNING AND A COUNTER PROPOSAL.

By Lieutenant-Colonel W. C. BEEVOR, C.M.G.
Royal Army Medical Corps (Retired Pay).

Careful study of the problems incident to evacuation of ineffectives from the fighting zones in war has led me to conclude that we are living in a fool's paradise in placing confidence in transport motor-lorries for this all-important duty, and this paper is presented with the view of placing before my colleagues the many factors that have shaken my faith in what appears to constitute the sheet anchor on which many rely. One hears on all sides the ready reply to questions on the subject of removal of sick and wounded: "I should depend on motor-lorries or ambulance trains, beyond the clearing hospital." Ambulance trains, yes, nothing better, where they happen to be available; but to place confidence in transport lorries is open to grave doubt, and I feel confident would lead to sore disappointment.

Let us study the conditions imperative to the proper conveyance of sick and wounded. The vehicle must be clean, promptly available at a convenient spot adjacent to the collecting zone, as silent and comfortable as possible, and capable of being driven to a point conveniently near an ambulance train, rest camp, etc., for unloading.

Regarding cleanliness, just reflect what the state of a meat lorry is likely to be at the end of a long journey, loaded with meat—some frozen, wrapped in salty muslin and sacks (always a foul smelling texture), some fresh and oozing sanious fluid from all sides. All very fine airily to remark: "Wash them"—where can you guarantee the proximity of sufficient water? And even granted this, how is the cleansing process to be carried out unless you can have a hose? Granted even this, what would be the condition of the surrounding ground after a goodly number of lorries had been effectively cleansed? This problem has to be faced more seriously at the other end of the stage, i.e., the refilling point or the rendezvous; this may be a railhead, but what railway station is equipped

with enough hose-pipe to grapple with a long line of lorries, and what would be the state of the yards after the flushing process had been completed? Think for a moment, and picture the ground after several convoys had been dealt with! No sanitarian would permit such a state to exist. Yet another deterring factor presents itself in this connexion, i.e., our brother workers of the transport service would have something to say regarding the long delays incident on all this washing procedure. It will require about half an hour to wash each vehicle and have it dry enough to reload; this, coupled with the time required for unloading the casualties, must seriously hamper their supply work. Take it that we require three minutes for each lying-down case, and several more to get them out of the way with all their equipment, etc., and an equal delay at the loading-up end, I calculate the transport work would be delayed two hours at each end for an average convoy under the most advantageous conditions—an impossible demand on any supply system, throwing out all calculations for meeting trains, detailing fatigue parties, storing goods ready for loading, etc. Further, all will agree that it is a great mistake to have helpless men blocked in the confusion of supply yards; there is no space in which to parade the sick convoy, tell them off to their respective destinations, and get the fatigue parties to collect the accoutrements and baggage prior to carrying it away with its correct party.

It may be argued that sick convoys need not be unloaded in supply yards; but where can we ensure an unloading place conveniently near ambulance trains, rest stations, etc., and not add to the delays already imposed upon the supply service? Picture to yourselves a long string of motor-lorries, blocking a main road to the station and surrounded by all the confusion of unloading the wounded, arranging them in groups for conveyance by stretcher, or even parading batches of walking cases, and I feel certain you will conclude the situation is an impossible one. You must remember that motor-lorries cannot be driven into fields so as to come alongside a rest station, as they cannot work on grass; and even if the rest station were on sound ground it would be very unlikely to afford sufficient space for the lorries to turn about. I understand from officers of the transport service that the large three-ton lorries require a wide space in which to turn; hence, the impracticability of relying on them in a road or yard unless the latter is of such dimensions as we seldom find in country stations.

Another factor militating against this scheme is the rest necessary for the transport drivers; they must remain with their wagons so long as they are being used, and cannot be expected to be kept on duty for the delay in unloading wounded.

Experts are of opinion that the large wagons are quite unfitted to carry bad cases, as they exhibit great vibration even on good roads; this leaves us only the light cavalry lorries, and these are frequently scattered over the country.

A Counter Proposal.

In any country likely to be the seat of war, public and private motor-cars are now established in great numbers, and a certain proportion of these may always be commandeered. Commercial light motors make excellent ambulance wagons, as also taxi-cabs, motor-omnibuses, and the larger private automobiles. For this country these could be subsidized, and for others, commandeered.

I therefore suggest the inspector-general of communications be empowered to carry out these undertakings in conjunction with his medical directorate. A certain number of automobiles and light lorries might even be transported by sea to any country without much expense. They are definitely preferable to horse vehicles, chiefly in the matter of personnel and horses, one driver and a few gallons of petrol doing the work of two men and four horses. A great advantage rests with light automobiles in their facilities for getting in and out of railway yards, hospital compounds, and the many enclosures in which temporary hospitals are likely to be located.

A CASE OF CEREBRAL TUMOUR INVOLVING THE FOURTH VENTRICLE AND CAUSING GLYCOSURIA.

By Lieutenant G. H. STRINGER.
Royal Army Medical Corps.

The following brief notes from a case which occurred in the Military Hospital, Up Park Camp, Jamaica, are published on account of the remarkable nature of the symptoms and the rarity of the case.

Staff-Serjeant P. W., Army Service Corps, aged 31, 12½ years' service, had been passed medically fit in December, 1912, and March, 1913. He was a moderate drinker and a heavy cigarette smoker, and took little or no exercise, as for some years exercise had made him short of breath. He was said to have been irritable for some weeks before his illness.

At 10 p.m. on September 5, 1913, the patient began to feel "queer." Vomiting and diarrhœa set in, with pain in the head and back; this lasted all night. At 6 a.m. he had a "fit" and became unconscious and stiff. He recovered after a few minutes and was able to walk to hospital.

On admission at 7 a.m., the patient was conscious and sensible, the pulse was good but of low tension; the heart was considerably dilated, and a faint systolic murmur was heard at the apex. All other organs and systems were apparently normal. He remained quiet in bed till 8.30 a.m., when he became restless and gradually unconscious; pulse very weak and almost imperceptible; pallor intense; breathing loud and stertorous; eyes slightly bulging and fixed; limbs rigid.

When seen by the medical officer ten minutes later his condition was

as follows: Unconscious; intense pallor; breathing shallow, but noisy and fairly rapid; pulse fairly good, regular, tension low. Pupils moderately contracted, no reaction to light. Conjunctival reflex absent. Heart considerably dilated, diffused apex beat, pulsation in the epigastrium and in the base of the neck. No murmurs could be detected, but the noisy breathing made auscultation difficult. The heart sounds were clear; arteries not thickened. The knee-jerks were absent, otherwise nothing abnormal could be detected in the muscular and nervous systems. No rigidity. The patient was very restless and could not be roused. One pint of urine was drawn off by catheter: sp. gr. 1038; acid; sugar present and in considerable amount, acetone reaction present. No smell from the breath.

The case was considered to be one of diabetic coma. Venesection was performed, followed by infusion of one pint of a saturated solution of bicarbonate of soda. Orders were issued for saturated solution of bicarbonate of soda to be given every two hours *per rectum*. Towards evening the patient improved. The corneal reflexes returned, and the pupils reacted slightly to light. He was very restless, with moderately active delirium. Saline *per rectum* was continued during the night.

September 6.—Condition unchanged. Sugar still present.

September 7.—Condition improved; could answer questions fairly intelligently but was not quite rational. Complained of headache. Urine normal in all respects.

September 8.—Improved, but intellect still clouded. Urine normal except for the presence of a few granular casts. A faint aortic systolic murmur present; heart otherwise apparently normal. Passed five motions involuntarily after a purge.

September 9.—Answered questions intelligently, but intellect still fogged; he did not know where he was. Pupils slightly contracted, no reaction to light. Nystagmus present. Knee-jerks absent; muscular and nervous systems otherwise normal.

September 10.—Mental condition unchanged. Urine normal. Heart apparently normal; no murmurs heard.

September 11.—No change except that pupils react sluggishly to light.

September 12.—No change.

September 13.—Early in the morning the patient had an attack similar to the one shortly after admission. It came on during sleep and lasted half an hour. There was no muscular rigidity, but as the fit passed off the right leg became semi-rigid. At 10 p.m. the patient had recovered, but was not so mentally clear as before. After the fit the condition was as follows: The pupils reacted neither to light nor to accommodation, the left pupil was slightly larger than the right; nystagmus was more marked. The knee-jerks were absent. Babinski's sign was present on the left side. The urine contained a trace of albumin.

At 12.30 p.m. the patient had another fit. It was longer in onset and

coma was not so deep. During this fit there was apparent paralysis of the right leg and arm, but this passed off as the patient recovered. After the fit, examination revealed left ptosis and paralysis of the lower half of the right side of the face. Koenig's sign was present on the left side, and Babinski's sign on the right. Cerebrospinal fluid was drawn off by lumbar puncture; the rate of flow was slightly increased, otherwise it was normal.

At 7 p.m. another but much slighter attack occurred, accompanied by twitching of the left side of the face.

September 14.—Conscious. Physical signs as on the 13th. Only the right plantar reflex normal. Specific gravity of urine 1035. A large quantity of sugar present, also a trace of albumin.

September 15.—Delirious during the night. Facial paralysis disappearing. The urine contained sugar and albumin. Plantar reflexes normal. Koenig's sign marked on both sides. Complained of pain in the back. Cerebral tumour in the region of the fourth ventricle diagnosed. Placed on iodide of potash.

September 16.—Mental condition improved. Ptosis and facial paralysis cleared up. The urine contained a trace of albumin but no sugar. Koenig's sign marked. Wassermann's reaction negative.

September 17.—Condition unchanged. Babinski's sign marked in the right foot.

September 18.—Slightly comatose. Facial paralysis reappeared on the right side. Babinski's sign present on both sides, also Koenig's sign. Back kept rigid.

At 4 p.m., as the coma was deepening and the back was rigid and contracted, lumbar puncture was done. The fluid came out in a continuous stream. The first flow was blood-stained, and it became more so till bright red blood appeared. The flow then stopped and the needle was withdrawn. When the blood appeared the patient became deeply comatose and cyanosed. The respirations were irregular and infrequent, and all reflexes were lost. Pulse almost imperceptible. Pupils slightly dilated, the left larger than the right.

The patient rallied slightly after this, and then gradually sank, and died at 2 a.m. on the 20th without regaining consciousness. Before death the temperature went up to 106·8° F. The urine remained free from sugar.

Post-mortem (eight hours after death).—Examination of the heart showed slight pericardial effusion, atheroma of the aorta, a patent and wide foramen ovale, and a small ante-mortem clot in the right auricular appendix. The valves were normal.

The surface of the brain was intensely congested, especially on the right side. On the arachnoid surface of the left side were white patches of plastic lymph. The meninges were adherent along the left side of the superior longitudinal sinus for the greater part of its extent; these

adhesions were recent and easily separable. When the brain was lifted out a large quantity of effused blood was found round the medulla, and in the lateral, third, and fourth ventricles. This blood was fluid, and rather dark, except in the right lateral and the fourth ventricles, which were almost entirely occupied by clot. The surface of the clot in the right lateral ventricle was white in parts, showing the ante-mortem changes. There was considerable necrosis and softening of the tissues in the fourth and right lateral ventricles.

When this blood and clot were wiped away a tumour could be seen at the base of the brain. The tumour was dark mulberry coloured; it was entirely circular in shape, the diameter being about that of a half-crown, and situated strictly centrally in regard to the sides of the brain. It was in contact with the crura cerebri, the circle of Willis, the third, fourth, and sixth cranial nerves, and the pons varolii. It was not adherent to any of these structures.

The tumour on section contained some blood effused throughout its substance. To the naked eye its structure showed gliomatous tissue. Microscopic examination showed a round-celled sarcoma with a preponderance of glial tissue. There were fairly large deposits of melanin from the hæmorrhages that had taken place into it.

Urine drawn off post mortem showed no trace of sugar.

It is regretted that no examination of the fundus oculi was made before or after death, partly on account of the persistent nystagmus and partly because the mental condition of the patient precluded concentration of his attention. No post-mortem examination of the eye was made, for reasons which are obvious, as the patient was a married man. It may be mentioned that the patient showed no evidence of failing vision. Up to four days before death he was able to read the newspaper without difficulty.

The unusual interest of this case is my excuse for publishing it. Diabetic coma, uræmia, and cerebral embolus from endocardial vegetation or clots were in succession considered as possibilities. Six days before death cerebral tumour with intermittent blocking of the fourth ventricle was diagnosed, and on the supposition that it might be a gumma large doses of iodide of potash were given. Cerebrospinal meningitis (endemic in Jamaica) was also considered during the course of the illness, in view of the presence of rigidity and retraction of the back and the presence of Koenig's sign. Two cases of this disease (one fatal) had occurred amongst the white troops during the previous twelve months. The fatal case had many points of resemblance to the case above. Other points of resemblance to cerebrospinal meningitis were the sudden onset with vomiting, and the persistent pyrexia. No diplococcus, however, was found in the cerebrospinal fluid. The diagnosis of cerebral embolus of cardiac origin was supported by the history of shortness of breath on exertion and the condition of the heart on admission. Another point of interest was the

variation of the signs, especially Babinski's sign, which was present alternately on the right and left sides.

Cerebral tumour producing glycosuria is rare, but it is rarer for it also to produce pyrexia, and its complications with a persistent foramen ovale, in my opinion, makes this case unique.

I am indebted to Lieutenant-Colonel J. B. Wilson, R.A.M.C., in charge of the Military Hospital, Up Park Camp, for permission to publish the notes of this case.

A SHORT ACCOUNT OF THE WORK DONE IN THE MILITARY FAMILIES' HOSPITAL, DEVONPORT, DURING 1913, WITH BRIEF NOTES ON THE MORE IMPORTANT CASES.

By Captain S. E. LEWIS.
Royal Army Medical Corps.

The hospital consists of a maternity ward containing 11 beds, a general ward containing 7 beds, a children's ward containing 4 cots, and an out-patients' department.

There were 144 maternity cases, and these can be classified into 136 vertex presentations, 3 breech, 1 transverse, 1 face, and 3 delivered by Cæsarean section. Abnormalities in addition to the above-mentioned presentations were fairly frequent, inasmuch as there were 2 stillbirths, 4 premature births, 2 cases of precipitate labour, 1 case of twins, 1 of hydramnios, 3 of adherent placenta, 3 of *post-partum* hæmorrhage, 1 of prolapse of the cord, 2 persistent occipito-posterior, 1 case of spontaneous inversion of the uterus, and 9 cases in which forceps had to be applied for various reasons. The Cæsarean sections were performed for eclampsia, inoperable carcinoma of the rectum, and on a woman who had suffered from epilepsy all her life, and having severely burnt herself as a result of a fit, gradually passed into a profound condition of status epilepticus. One woman died from shock due to inversion of the uterus.

In the general ward, 171 cases were admitted, 85 being children and 86 women. Total admissions for the year, 315.

In addition, 1,067 cases were treated either at the out-patients' department or in their homes. There were 52 cases of extraction of teeth; 104 women attended on Thursdays as special gynæcological cases, and 101 major and minor operations were performed.

Brief Notes on the More Important Cases.

Supravaginal Hysterectomy.—Mrs. C., aged 42, was admitted suffering from menorrhagia of three years' duration. She was very anæmic from the continual loss of blood. The uterus was enlarged and irregular in outline, but was freely movable and the cervix was normal. The uterus,

along with one ovary which was cystic, was removed. It contained large submucous and subperitoneal fibroids, as well as numerous intramural fibroids.

LIST OF SURGICAL OPERATIONS.

	Operation	Number of cases	Successful	Partially successful	Died	Remarks
1	Supra-vaginal hysterectomy ..	1	1			
2	Cæsarean section	3	3			
3	Removal of parovarian cyst and pyosalpinx	1	1			
4	Ventro-suspension of the uterus..	1	..	1		
5	Exploration for abscess of the lung	1	..	..	1	
6	Radical cure, inguinal hernia ..	4	4			
7	Empyema	2	2			
8	Appendicitis	1	1			
9	Tubercular periostitis	2	2			
10	Replacement of inversion of the uterus	1	..	..	1	
11	Curetting of the uterus	8	8			
12	Retro-pharyngeal abscess ..	2	2			
13	Removal of nævus	8	8	..	..	CO_2 snow used.
14	Removal of Bartolin's cyst ..	1	1			
15	Removal of varicose veins ..	2	2			
16	Removal of suppurating prepatellar b rsa	1	1			
17	Removal of tubercular glands of the neck	3	2	..	1	
18	Cellulitis of the neck opened and drained	2	2			
19	Removal of foreign bodies ..	2	2	..	..	(Local anæsthetic, quinine urea hydrochloride.)
20	Removal of tonsils	14	14			
21	Removal of cysts	3	3			
22	Removal of lipoma	1	1			
23	Abscess of breast opened and drained	2	2			
24	Removal of adenoids	12	12			
25	Extraction of several decayed teeth	2	2			
26	Circumcision	17	17			
27	Lumbar puncture	1	..	..	1	
28	Removal of adherent placenta ..	3	3	..	..	1 case of hour-glass contraction.

Cæsarean Sections.—Mrs. S. was admitted to hospital in May, eight months pregnant, for "hæmorrhage from the vagina and rectum, and vomiting." On examination a large growth was found in the rectum, surrounding the gut. The finger passed through this growth with difficulty and caused hæmorrhage. The cervix was fixed and ulcerated and bled freely on examination. There was a history of increasing constipation for the past nine months. Marked ballooning of the rectum was present. The child was delivered alive, but died a few days later.

Examination of the growth showed widespread disease. The patient refused colotomy prior to opening the abdomen, so no attempt was made to deal with the obstruction. She left the hospital greatly relieved, constipation being not nearly so marked. She then went to London and was treated with radium. This patient died in the hospital in February, 1914.

Mrs. O., six months pregnant, was admitted suffering from severe headaches and swelling of the legs of one week's duration. She stated she had been passing very little urine recently, and was also suffering from severe epigastric pain. The eyelids were very puffy and the legs œdematous. The urine turned solid on boiling. During the night convulsions began, five occurring in less than an hour, the patient failing to regain consciousness after the last convulsion. As the cervix only admitted the tip of one finger and was very rigid, she was delivered by Cæsarean section as soon as the theatre could be prepared. The child only lived a few hours. The patient had no more fits and made an uninterrupted recovery.

Mrs. L., an epileptic from birth, was admitted, eight months pregnant, suffering from severe burns on the breast, face, and both arms, the result of falling on the fire during a fit. The patient had been in hospital twice before for injuries due to epileptic fits. The urine was free from albumin. Several fits occurred daily, although she was on large doses of bromide, and she gradually passed into the condition of status epilepticus. Six days after admission the pulse began to fail, being weak and varying between 140 and 150 per minute. An attempt to induce labour failed. Cæsarean section was rapidly performed and a living child delivered. The patient was *in extremis* for several days, but gradually made a good recovery. Mother and child were discharged two months after admission.

Parovarian Cyst and Pyosalpinx. — Mrs. B., aged 33, married four years, no children, was admitted complaining of menorrhagia and pain in the left lumbar region, more severe at the menstrual periods than at other times, of three years' duration. Nothing definite could be made out by palpation or vaginal examination, but on rectal examination a tumour could be felt partially filling up the pouch of Douglas. Temperature and pulse were normal. On opening the abdomen the left tube was of the characteristic retort shape, the abdominal ostium of the tube being closed. Adhesions were numerous. From between the layers of the broad ligament a cyst as large as an orange was removed, along with the left tube and ovary. The patient was discharged free from pain three weeks after the operation.

Ventro-suspension of the Uterus.—Mrs. P. was admitted to hospital suffering from complete procidentia of the uterus of two years' standing. There was a large erosion on the cervix, and the patient was kept in

bed and treated till this was healed. Ventro-suspension was then carried out. The patient was discharged greatly relieved.

Abscess of the Lung.—Mrs. J. was admitted to hospital suffering from acute lobar pneumonia. The disease ran a typical course, and the crisis occurred on the ninth day. Two days later the temperature and pulse again began to rise, and large quantities of extremely foul sputum were coughed up at intervals of about two days. On examination all the signs of solid lung were marked over the right base. The patient's sputum was not unlike pus from abscess of the liver, only it was much more offensive. She had been in India and had suffered from dysentery two years ago. The liver was certainly not enlarged downwards. Several aspirations of the liver both back and front proved negative. The lung was also aspirated without success. A post-mortem examination revealed a large abscess in the centre of the lower lobe of the right lung, the liver being normal in all respects.

This case seems worth recording on account of the extreme rarity of abscess of the lung as a complication of lobar pneumonia. The situation of the abscess and the fact that the patient had suffered from dysentery also rendered the diagnosis uncertain.

Appendicitis.—Mrs. S. was admitted, very ill, complaining of pain in the right lumbar region. Temperature 102·8° F.; pulse weak, 136; abdomen rigid. She had been ill a fortnight previous to admission. Examination revealed a large abscess in the right lumbar region, and also that the patient was five months pregnant. The abscess was opened and drained till healed. Two days after the operation a fæcal fistula developed, but it soon closed. Abortion occurred five days after the operation. The patient was discharged five weeks later with the wound soundly healed and free from pain.

Spontaneous Inversion of the Uterus.—Mrs. W., a primipara, was admitted in the first stage of labour. As labour was tedious forceps were applied and a living child easily delivered. The placenta came away without expression half an hour afterwards. I saw the patient for the first time an hour after labour, as she was in great pain and bleeding profusely. Examination showed that the uterus was inverted. It was immediately replaced under chloroform without any difficulty. In spite of saline intravenously, adrenalin, strychnine, digitalin, etc., she died seven hours after labour.

Acute Lobar Pneumonia.—H. C., aged 10 months, was admitted with all the signs and symptoms of lobar pneumonia, practically the whole of the right lung being affected. The temperature ranged between 103° and 105° F., and the pulse between 130 and 160 till the seventh day, when the crisis occurred, temperature and pulse falling to normal. Convalescence was rapid.

I mention the case as lobar pneumonia is somewhat rare in infants.

Infantile Hæmorrhage.—M. S. was born in the hospital, apparently

healthy. Three days later subcutaneous hæmorrhages appeared, the head being chiefly affected. The next day a large submucous hæmorrhage on the hard palate, and bleeding from the nose, rectum, and vulva began, and continued till her death on the thirteenth day. The cord separated on the seventh day; severe hæmorrhage from the umbilicus began on the eleventh day. Saline *per rectum*, calcium lactate in large doses, tincture of perchloride of iron, adrenalin, and strapping the umbilicus were tried with little effect.

Lumbar Puncture for Meningitis.—A child, aged 2, was admitted with all the signs of cerebrospinal meningitis; opisthotonos, general muscular rigidity, high fever, rapid pulse, and a well-marked eruption being present. Lumbar puncture was performed, and a cloudy fluid gushed out. As soon as the flow had lessened twenty-five cubic centimetres of warmed anti-meningococcic serum were injected without removing the syringe. A slight improvement followed, and the same procedure was carried out the next day, without much effect. The child died three days after the last injection.

A CASE OF HÆMORRHAGIC SCARLET FEVER.

By Captain G. H. DIVE.
Royal Army Medical Corps.

The patient, Serjeant B., 2nd South Wales Borderers, aged 38, was admitted to the Military Hospital, British Legation Guard, Peking, on January 8, 1914, and died the same day. There was a doubtful history of malaise of some four days' duration, but no definite time or place of infection could be traced. Such cases, however, are of occasional occurrence in North China, and scarlet fever in the ordinary form is very common and very fatal among the younger generation of Chinese. Actually the patient attended in the morning for the first time, stating that he had passed nothing from his bladder for thirty-six hours. Seen at 9.30 a.m. he complained of a certain amount of abdominal pain, and on examination a tense, rounded, non-resonant mass was found extending from the pubes to within two inches of the umbilicus. The general condition showed no particular feature beyond a certain uneasiness of manner, which at the time aroused some suspicions as to the seriousness of the case—suspicions that were fully and speedily justified. There was no fever, no rash, and but slight sore throat. The mental condition was clear. Small contusions of the scalp, buttock, and ankle were present, and were attributed to a fall on the previous day. A rubber catheter (No. 8, English) was passed without difficulty, but nothing beyond one ounce of dark grumous fluid escaped. Steps were at once taken to wash out the bladder and at the same time to establish its integrity.

This was accomplished by a series of washings out with warm boric solution, all ingoing and outcoming fluid being measured; an excess of two pints was recovered. The contents of the bladder proved to have been practically solid blood-clot with little or no admixture of urine.

Attention was now directed to promoting the action of the kidneys, and to maintaining that of the heart, which up to the present had been strong.

At 4 p.m. the patient suddenly passed from a clear mental state to one of obscurity; low muttering delirium developed, with marked tremor of the tongue and hands. The heart's action became very feeble, and an early and fatal termination was to be anticipated. At 5 p.m. a blush appeared over the lower part of the abdomen, and within half an hour had developed into a very characteristic scarlatiniform rash. The temperature now began to rise (99·4° F.), and probably these two features were correlated. At 6 p.m. the patient had passed into a condition of stupor, the pulse became quick and feeble, and the rash disappeared, death occuring at 9.30 p.m.

At the subsequent post-mortem examination the following pathological conditions were found: Heart: weight, twelve ounces; fatty. Coarse hæmorrhages into the mesentery, falciform ligament, and omentum, the largest being six ounces. Liver: weight, seventy ounces; very fatty. Kidneys: acute congestion with capillary hæmorrhages. Bladder: numerous local hæmorrhages (submucous, intramuscular, and subperitoneal), the largest one inch in diameter and the average a quarter of an inch. The wall was intact, and no urine was present in the viscus. The other organs, including the pancreas, were apparently healthy.

The diagnosis of such cases as the foregoing must always to a certain extent be obscure, and very often must rest on probability alone. In North China, after full consideration of the long list of hæmorrhagic diseases, there remain three which demand special attention—typhus, smallpox, and scarlet fever. These, fortunately, are uncommon among the foreign population, but all are of sufficiently frequent occurrence to necessitate their being constantly borne in mind. In this particular instance the diagnosis almost certainly rested among the diseases named, and personally I have but little hesitation in adopting the third, a course in which I have the support of those of my colleagues with the most extended local experience of such conditions.

CEREBRAL SYPHILIS AND SALVARSAN—THE USE OF IODIDES.

By Captain G. H. DIVE.
Royal Army Medical Corps.

In the Journal of the Royal Army Medical Corps for November, 1913, is reported a case of death from syphilis occurring nine days after injection of salvarsan. The post-mortem revealed a condition almost identical with that found in a case of a foreign soldier who died recently at Peking. Here, again, no signs or symptoms were exhibited prior to his fatal illness, and to complicate matters he was not known to have suffered from syphilis. For the particulars I am indebted to one of my colleagues, with whom I saw the case. A soldier, aged 21, was admitted to hospital with pains in the joints, lumbago, injection of the face, and slight fever (100·4° F.), subsiding at night. Three days later he developed a scarlatiniform rash of the legs which ended abruptly at the girdle. Within forty-eight hours the pains, rash, and fever were gone and desquamation had commenced. It is problematical what bearing, if any, the above train of symptoms had on subsequent events. Eight days after admission he had premonitory cramps and tingling in the arms and legs, and next day developed complete left-sided hemiplegia, dying seventy-two hours later. Post mortem a large gumma was found in the right nuclear region of the brain, and in addition extensive recent hæmorrhage.

It is interesting to speculate, had this patient at any time come under treatment for syphilis, how far the administration of salvarsan would have precipitated the train of events ending in death. Of more immediate importance, however, is the bearing in mind of the fact that advanced syphilitic lesions may exist in the brain without apparent symptoms, and moreover, in cases that have been efficiently treated with mercury.

Of recent years in the treatment of syphilis the iodides have largely and perhaps unjustly been relegated to a very inferior position. Certainly in cases where the administration of salvarsan was a vital necessity I have found the associated use of iodides of very considerable value in the process of healing. Could they be recognized in advance it is in just such cases as the two quoted above that iodides would be called for. Personally, before administering salvarsan in long-standing cases, I make it a rule to put the patient on a course of iodide of potassium.

With reference to the question of a local reaction with hæmorrhage following the injection (with neosalvarsan in this particular case), I have recently had the opportunity of witnessing this phenomenon in progress. A soldier struck off the syphilis register in March, 1913, after two years' treatment, developed in January, 1914, characteristic specific ulcers of the tongue. I gave him mercury, iodides, and salvarsan, with rapid

disappearance of all signs as the result. Five days after this he developed a large and painful ulcer of the buccal mucosa. I gave him ·75 grm. neosalvarsan intravenously; forty-five minutes later he began to spit blood, and in the course of the next four hours expectorated approximately two drams of this. Bleeding from a vessel at the margin of the ulcer was present—this had never occurred before, and, moreover, the position of the lesion and the circumstances of the case precluded the possibility of trauma. To translate such a diseased vessel from another site to the brain, and for an ulcer to substitute a gumma requires but little imagination; then injection of "606," reaction, hæmorrhage, and another death attributed to salvarsan.

A PLEA FOR THE TRIAL OF "DRY" URINALS IN STANDING CAMPS.

By Quartermaster-Serjeant E. B. DEWBERRY.
Royal Army Medical Corps.

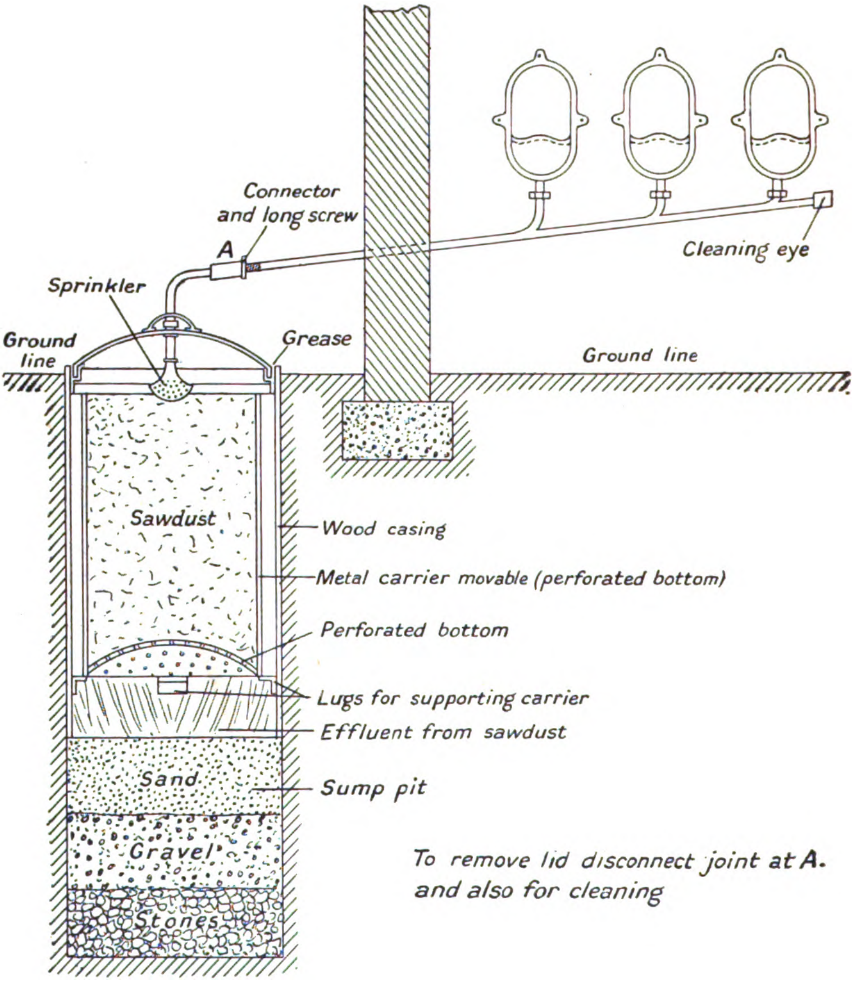
"Dry" urinals, in which the urine is absorbed by some suitable material, might if adopted in standing camps prove to be both economical and sanitary. The material utilized for absorbing the liquid would differ according to circumstances. Sawdust if easily obtainable is no doubt the best material, as afterwards it can be burnt in the camp incinerator. It has also the advantages of being cheap, non-heating, and very absorbent.

Specimens	Specific gravity	Solids	Parts per 1,000			
			Urea	SO_2	P_2O_5	Cl
Fresh urine (faintly acid)	1020	44·20	23·8	1·38	2·39	4·08
Urine after filtration through sawdust (alkaline)	1034	127·9 (All	*Nil* reduced)	8·30	13·41	38·00

Apart from experiments made by myself, a large number in which sawdust was utilized for the absorbing material were carried out by the late Dr. Vivian Poore, in all kinds of weather, and indoors as well as in the open air, and in no instance did they give rise to any offensive smell. At Dr. Poore's recommendation a dry urinal was tried in some carpentering works at Twickenham where one hundred and sixty workmen were constantly employed. For the disposal of the urine in this case a trough was filled with sawdust, and arrangements were made for drainage. The sawdust was changed twice in four months and remained perfectly sweet,

no odour of urine or of putrefaction being noticeable. The amount of drainage from the trough was insignificant and, what is more important, inoffensive.

The table on p. 79 gives the results of the analysis of the urine before and after passing through the sawdust.



Physical characters: Fresh urine, pale yellow, clear, with a small opaque zone from mucus; normal urine odour. Sawdust filtrate, dark mahogany-brown colour, markedly opaque and somewhat turbid; peculiar woody (resinous) odour, faintly ammoniacal.

From my own experiments I also found the absorbing power of sawdust to be very great.

In the construction of a dry urinal care should be taken to provide as large an evaporating surface as possible, and if sawdust is employed as the absorbing material it should be frequently stirred. The material must be protected from rain, and proper arrangements made for the effective drainage of the filtrate. If dry sawdust is not available "peat moss" can be utilized for the purpose.

The appended sketch, the working of which explains itself, shows a type of "dry" urinal. After the urine has left the glazed earthenware urinal basins it passes down the pipe, and is distributed over the absorbent material in the metal carrier, any filtrate not retained passing through the perforations in the bottom of the carrier into the sump. The carrier, which is made of galvanized iron, is held in place by wood casing sunk in the earth over a sump pit. A screw connexion for cleaning purposes is provided on the pipe leading from the urinal basins. When necessary the metal carrier can be lifted out and its contents burned in the camp incinerator. As the amount of the filtrate would be comparatively small, it is not likely that any well situated in the vicinity of the camp would become contaminated.

A MONTH'S COURSE OF TRAINING IN BACTERIOLOGY AND BACTERIOLOGICAL TECHNIQUE.

By Captain A. W. BYRNE and Captain P. S. TOMLINSON.
Royal Army Medical Corps.

The privilege of taking out the above course has only recently been extended to officers of the Royal Army Medical Corps, and a short account of it may be of interest to officers of our Corps serving in India.

The course is held at the Central Research Institute, Kasauli, a hill station about six thousand feet above sea level. The most convenient railway station is Kalka, nine miles away, and Kasauli is reached by pony in about two hours, or by rickshaw in three to four hours. There is a good residential club, where one is made very comfortable; living all told amounting to about Rs. 200 a month. Besides the club, which is often full, there is a good hotel, also several boarding-houses.

The course lasts one month, and four are held during the summer months of the year, commencing in May and terminating in August. Each course consists of lectures, demonstrations, and practical laboratory work.

The daily work is as follows: A lecture and practical demonstration commencing at 10 a.m. and lasting usually about one hour and a half. After the lecture, a practical laboratory class is held in connexion with the subject lectured upon. Members of the class may work in the

laboratories as long as they wish, and may present themselves in the morning as early as they feel inclined. The actual working hours are from 10 a.m. until 4 p.m., with an interval for lunch. Certain days are set apart for instruction at the Pasteur Institute of India. A shorter or longer time is given to certain of the subjects mentioned in the syllabus below. Research workers at the Institute usually give a demonstration on the special subject of their research, e.g., goitre. The following is a short syllabus of the course:—

CENTRAL RESEARCH INSTITUTE.

Preparation of laboratory apparatus—glass; the microscope; the fitting up and cost of an improvised laboratory, with plans and estimates; the study of a bacterium and the routine examination employed in isolating any unknown organism; preparation of vaccines and vaccine therapy; opsonic index; the preparation of culture media; agglutination and sedimentation; Bordet-Gengou and Wassermann reactions; the bacteriological examination of water; examination of excreta for animal parasites and their ova; typho-coli group; dysentery; cholera; relapsing fever; Mediterranean fever; tuberculosis and tuberculin treatment; malaria; mosquitoes. Examination of blood.—(*a*) Enumeration of red and white cells and differential count; (*b*) estimation of hæmoglobin; (*c*) volumetric estimation of red blood cells; (*d*) antitryptic power; (*e*) calcium content; (*f*) hæmolytic points; (*g*) alkalinity; (*h*) measurement of viscosity; (*i*) salinity; (*j*) specific gravity; (*k*) coagulation time.

PASTEUR INSTITUTE OF INDIA.

Rabies.—(*a*) Symptoms of, in man and animals; (*b*) classification of bites; (*c*) when to send, and when not to send a patient up for treatment; (*d*) modified Pasteur treatment with practical demonstration of the preparation of the anti-rabic vaccine.

Snakes.—(*a*) The poisonous and non-poisonous snakes of India; (*b*) symptoms and treatment of snake-bite. Instruction in the identification of snakes is rendered more interesting by a demonstration of all the most important types in their living condition. In this way, too, is learnt the proper method of handling live snakes without danger.

(*c*) Blood examination and its fallacies.—Useful synoptical tables are given out during the course, illustrating, for example, the differences between malarial parasites, the varieties of anopheline mosquitoes, species of snakes, etc. By the end of the month one has also an interesting collection of photographs of bacteria, parasites, various reactions, etc.

We wish strongly to emphasize the many advantages of such a course as outlined above. Instruction in the majority of courses is followed by an examination. This is not the case at Kasauli, and an officer enjoys the privilege of doing good work without the worry of an examination. The course counts as duty and a selected officer obtains travelling allow-

ance to and from Kasauli. He loses neither leave nor the pay of any appointment he may hold at the time. Furthermore, he spends a very pleasant month in a hill station, away from the trying hot weather on the plains of India.

From the syllabus it will be seen that the course is a most interesting and valuable one. It affords one a unique opportunity of familiarizing oneself with the most recent advances in tropical bacteriology under a staff of able teachers and in well-equipped laboratories.

In conclusion, being the first officers of the Royal Army Medical Corps to do the course, we wish to express our keen appreciation of the kindness, courtesy, and assistance of the director and his staff.

Echoes from the Past.

INTRODUCTORY LECTURE DELIVERED AT NETLEY ON THE TWENTIETH ANNIVERSARY OF THE OPENING OF THE ARMY MEDICAL SCHOOL, OCTOBER, 1880.

By Surgeon-General T. LONGMORE, C.B., Q.H.S.

Associate of the Society of Surgery of Paris; Officer of the Legion of Honour; Professor of Military Surgery in the Army Medical School.

We are to-day commencing the twenty-first year of the existence of the Army Medical School. Twenty years have passed, forty sessions have been held, since I delivered the introductory lecture at Fort Pitt, Chatham, on the opening of the School in October, 1860. Twenty years form a period of considerable importance, not only in an individual life, but also in the history of an establishment such as the one with which most of you are only to-day becoming personally acquainted. The work which has been done, the changes which have taken place during this period, sufficiently attest the correctness of the latter part of this assertion. During these twenty years, 804 commissioned officers in the British Army Medical Department and 568 in the Indian Medical Department have entered the service through the School portals. Candidates for commissions in the medical branch of the Royal Navy came for the first time in 1871 to attend the courses of instruction, and since that year 216 Naval candidates have taken part in them. Altogether, 1,588 surgeons have passed through the school prior to receiving commissions in one or other of the branches of the public service, giving an average

of nearly forty each session. During most sessions, together with the candidates there have been some commissioned medical officers attending the School. The total number of such officers, up to the close of the last session, amounted to 256.

I am not able to say how many of the surgeons who obtained commissions in the three sections of the public service through the School still hold appointments in them, but with regard to the 804 who were commissioned for the medical service of the British Army, it may be interesting to mention that there remain 583 in active employment at the present time. This shows a loss by various casualties of 221 out of the 804 surgeons, or over 27 per cent, during the twenty years. The 221 casualties consist of 115 lost by death, of 76 who have left the service for various reasons, and 30 retired on half-pay.

Death, during these twenty years, has not spared the brightest and most distinguished among the promoters and supporters of the Army Medical School: Lord Herbert, the master-mind in the prolonged and searching inquiries that led to its establishment; the sagacious framer of the principles that were laid down for regulating its administration, the scope of its work, and the maintenance of its vitality; the disinterested commissioner, statesman, and minister, who in this, as in all his other official undertakings, had the Army's and country's best interests at heart, was taken away, in the prime of life, within a year after he had opened the School; before it had acquired, it might well be thought, sufficient strength to maintain itself without the powerful support of its founder.[1]

Director-General Alexander, the accomplished, fearless soldier-surgeon; most honest, open, and straightforward; who, as one of the Royal Commissioners under the presidency of Sydney Herbert, took an active part in the organization of the School; and who, raised comparatively early to the highest post in the Army Medical Department, would have been a constant prop to the School had he lived, but who was carried off by sudden fatal illness before he could even see it start on its career.

Sir James Gibson, his successor, who was present and took part in the opening proceedings, and who honestly tried to promote what he believed to be calculated to advance the interests of the School, and the standard of professional education in the department over which he presided.

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[1] Lord Herbert died on August 2, 1861. He personally opened the School in October, 1860, and then appeared to be in vigorous health.

Sir James Clark, whose active mind from the days of his service in the Royal Navy, and great influence during many years with the Court and highest functionaries of the realm, were constantly employed for the advancement of medical education in the military services as well as in civil life; who, as recorded by one of his biographers, organized the method of examination when the Government, in 1854, determined to open the Indian Medical Service to unrestricted competition; who not only took a leading part in the establishment of the School as a distinguished member of the Royal Commission presided over by Sydney Herbert after the Crimean War, but was subsequently himself President of the Committee which made the arrangements adopted by the Minister of War on its removal from Chatham to Netley; who, to the latest period of his most useful career, even in his venerable old age, still maintained a warm interest in the institution and its welfare.

Sir Ranald Martin, another of the Royal Commissioners who acted with Sydney Herbert, a most earnest friend of the objects of the School, and always ready to give a helping hand in advancing it, either as a member of the School Senate or by his private influence and advice.

Dr. Parkes, the devoted founder of the system of study of practical Army Hygiene at the School, whose world-wide reputation in his profession, no less than his perfect character and benevolent disposition, gave him an influence for good that few can realize who were not intimately acquainted with him and his works.

All these have been removed in the course of the period that has elapsed since the School was first organized and inaugurated twenty years ago.

And, although not connected with the School at the time of his death, yet having been associated with it for the five years just preceding that sad event, in assisting me in the duties of the Chair of Military Surgery, I cannot but add the name of Surgeon-Major Porter to the roll of distinguished men I have just enumerated. The soundness of his judgment in surgical diagnosis, the dexterity he had acquired as an operator during his term of office at Netley, his zeal for the professional reputation of his department, his indefatigable industry and devotion to duty, his warm-hearted and amiable disposition, formed a combination of qualities which made not only myself but others who were well acquainted with him look forward to his filling the highest posts in his department with distinguished credit; and, though all too brief, his career in Afghanistan, particularly that part of it when he was directing the

medical affairs of the Cabul field force, as testified by the honourable tribute paid to it by the General Commanding and by the regrets of his comrades, sufficiently proved that these anticipations had been well grounded. The death of Surgeon-Major Porter was an irreparable calamity to his personal friends, and a grievous loss to the branch of the profession of which he had already become a conspicuous ornament.

During the interval that has passed since the School was inaugurated by Lord Herbert at Chatham, important changes have also occurred in some of its administrative arrangements and regulations. It is not my present purpose, however, to review the past history of the School, and I will only now refer to one change, recently made, because it may affect some of you injuriously, and to a certain extent defeat the object of your coming to the School, if you will allow it to do so. It must depend chiefly upon yourselves whether this is the effect of the alteration I allude to or not. The change is this: you who are probationers in the Army Medical Department now come here with your order of merit and place in the public service already fixed; that is, in case nothing should occur to prevent you from receiving a commission at all. With the exception of the first session, at which time the best mode of classifying the probationers at the School was still under discussion, the rule has been for the positions of the candidates to be settled after the completion of the course of study in the work of the School, not before it. The marks gained in the entrance competitive examination in London, and the position taken according to them, counted; but so also did the work done at the School, and the results of the examination upon that work at the close of the session. The marks gained in this final examination were added to the marks gained in the competitive examination in London; and the two sets of marks combined settled the final order of merit and future position in the service. Now the examination at the close of the session at Netley is only a qualifying one as regards the surgeons on probation of the Army Medical Department; with those of the Indian service and Royal Navy, the examination is still a competitive as well as a qualifying one, and its results still count in arranging the lists for commissions. The effect of the old arrangement in the Army Medical Department was to stimulate candidates to extra exertion in following the studies at the School. The candidate who arrived from London No. 1 on the list, worked hard to maintain his position; No. 2 strained his energies to try and become No. 1. Some who happened to be at or near the

bottom of the list, would work to their utmost to obtain a less unenviable position. Some who had gone through the ordeal for their general professional qualifications a few years before competing for an Army appointment, and who, from having become rusty in some of the details of the subjects on which they were examined, had not gained the place they thought themselves entitled to, worked hard at Netley in the hope that their diligence and practical professional knowledge might retrieve the loss in position they had sustained at the London examination. Thus in various ways, and from various motives, the fact of the amount of practical work done at Netley having an influence in determining the future position in the service, acted as an incentive to increased study and exertion. The experience of the last two sessions, during which the change of system was brought into operation, has proved, I regret to say, that the removal of the stimulus to exertion has led, in a large proportion of instances, to the removal of the exertion itself. Neither the duties in the wards, nor the studies in the practical hygienic and pathological rooms, were conducted with that zeal and attention to which we had been previously accustomed; and in the concluding examinations the contrast between the work done, and the knowledge shown by those, on the one side, whose positions partly depended on the results of the examinations, and by those, on the other side, whose positions were already fixed and independent of them, was so strongly marked that the Professors felt it incumbent on them to make a full representation of the subject to the governing authorities of the School. There was no attempt, on the part of the probationers of the Army Medical Service, to disavow the fact that they had not laboured as their colleagues of the Royal Navy and Indian services had done, nor to conceal the motives of their relative inactivity. In one instance, the neglect of taking ordinary advantage of the means of instruction at the School, imposed on the Professors the painful task of reporting the gentleman in question as not sufficiently qualified to be recommended for a commission; and he lost the appointment he was hoping to obtain in consequence. I can only call your attention to the facts I have mentioned, and ask those of you who are surgeon probationers for the Army Medical Department, as gentlemen who have already attained an amount of professional experience that will enable you to judge yourselves of the value of the practical knowledge which will be placed within your reach, that you will do your best to grasp and retain it while you can do so. The information which you will have the

opportunity of acquiring here is all of a practical kind; it is information which you have not had the opportunity of acquiring while pursuing your regular studies in the civil schools; it is of a nature to add greatly to your value and power of usefulness in your everyday service as Army Medical Officers; and if the opportunity of gaining practical acquaintance with it now offered be lost, it may probably never occur to you again. I do not think it likely to be of advantage to enlarge further on this subject; but I could hardly address you on this occasion, when you are about to commence your work at the School, without making the remarks which I have just made, and trying to turn to account, for your own benefit and that of the Army Medical Service, the observations which the last two sessions have forced on the attention of the Professors. At the same time, I must not hide from you the fact that you who have come for this session will be placed at a disadvantage as compared with your predecessors in respect to the amount of time there will be at your disposal for acquiring the practical information I have alluded to. There is only room for thirty-six gentlemen to work in the hygienic laboratory, or pathological department, at one time. As the number sent down for the present session is one hundred, it is an obvious result that you will have to be divided into three sections for work, and a little further consideration will show that as the same work will have to be gone through separately for each section, you can only get the opportunity of doing one-third of the amount that was originally designed to be done, and that would be done if there were adequate accommodation for the whole number to work together during the four months the session lasts. All that the Professors can do under the circumstances is to do the best the time and space afforded to them will allow. This they will do, and they hope that you will second their efforts to the utmost of your ability, and thus hereafter be enabled to look back upon the time you are now entering upon at Netley as a time not merely of pleasant and agreeable intercourse, which they sincerely desire it may be, but also as a time pregnant with useful acquirements destined to be of benefit to yourselves, and to those who may come under your professional charge, throughout your career in the public service.

I will now leave the topics I have been touching upon, which, in some respects, may be regarded in the light of family matters incidental to our school relations, and will ask your attention to a subject of more special interest in connexion with my own

department of military surgery. I propose to make some remarks during the time that remains to us on the question of introducing the antiseptic method of treatment into military field practice. It may be seen from the discussions which have recently occurred in this country on the subject, that, although the number of adherents to the antiseptic method of treatment of wounds has largely increased during the last few years—some of the most eminent practical surgeons of the kingdom, and some former opponents, being included in this number—still the rule of antiseptic surgery, in its strict sense, can by no means be said to be universally accepted in civil practice ; but still less is it acknowledged as a method to be followed in field practice. The military aspects of the subject have hitherto absorbed far more of the attention of army surgeons on the Continent, especially in Germany, than it has done among army surgeons in England. I think it hardly possible, however, for anyone to become acquainted with the experience which has been published in Germany by Dr. Reyher and Dr. Bergmann of the effects of the antiseptic treatment of gunshot wounds during the last Russo-Turkish War, the results of the practice of Surgeon-General Dr. Cammerer in Roumania, during the same war, among the wounded from Plevna, or the writings of Volkmann, Esmarch, Nussbaum—all surgeons practically acquainted with the treatment of gunshot injuries on a large scale—without acknowledging the importance of the subject, and almost coming to the conclusion that we are on the eve of something like a revolution in the practice of military surgery. I do not think it possible yet to see the full results of the employment of antiseptic treatment in military practice, nor to forecast with anything like precision what it will settle down to, should it be generally adopted. The experience, taken altogether, which has hitherto been gained in the application of it in the field is still comparatively limited in amount. It has not been practised in the field in any instance by British surgeons, as far as I am aware. I need not say to those who know what is meant by "antiseptic surgery" in the modern sense of the term—by *asepticism*, which has been suggested as a better definition—that the mere application of carbolized tow, or of dressings of lint soaked in carbolized oil to wounds, does not constitute it, though wounds dressed in this manner have been quoted as having been treated by the antiseptic method. Asepticism means a good deal more than this. For practical use the name *Listerism* seems to be a very convenient one. There is no confounding, under this designation, the various kinds of practice

which are sometimes spoken of as the antiseptic mode of treatment. Moreover, it appears to be a very proper as well as expressive term; for, without at all committing one's self to the theory on which Lister has based his practice, it expresses what that practice is in its entirety; and if the practice be sound, if it be true that it produces more advantageous results as regards the saving of lives and the healing of wounds than any previous mode of practice, it is but simple justice that a name should be given to it which will remind all that use it, and all that hear it, of the eminent surgeon to whose talents, scientific researches, and indefatigable perseverance, the introduction of the treatment, regarded as a whole, is entirely due.

I have referred to the use of the antiseptic method of treatment, Listerism, presuming it should be generally adopted, as involving little less than a revolution in military surgery. Is it right to speak of it in this way? It has been truly observed, on many occasions, that all surgical practice is antiseptic in principle—that almost all surgical dressings and applications are, or are intended to be, antiseptic; just as it has been said that not merely a certain phase of modern surgery, but all surgery from its very commencement, has had a just claim to the title of "conservative surgery." What true surgeon ever treated a wound without having in view the removal of septic elements in the wound itself, and the prevention of any conditions which might lead to septic poisoning of the patient's constitution? What surgeon ever treated a gunshot wound of any severity, without endeavouring to arrest and get rid of the gangrenous and putrefactive condition which the very nature of the injury had in varying degrees brought about, without trying to ward off the extension of a similar putrefactive and septic condition to other wounds, which, though they might be less liable to a change of the kind from self-contained elements, were exposed to the risk of becoming septic, by septic agents being carried to them by contact, or through the air, or by other undiscovered means. True, in the days when hospital gangrene, pyæmia, and septicæmia were common, sometimes terribly destructive, in our military hospitals, the means of prevention were not well understood; but it would be an unjust reflection on the great military surgeons of former days not to acknowledge that the prevention of these septic disorders was the great aim of the remedies which they habitually employed—the main purpose to which all their efforts were directed. And so with conservative surgery. If the limb were sacrificed by the military surgeon, was it not to preserve a life which was in

jeopardy, either from the nature of the injury, or from the circumstances under which the patient was placed, or from a consideration of both combined? If the damaged joint were excised, was it not to preserve the limb? If the shattered bone were treated without the use of the knife, were not the same conservative measures always in view? Is Listerism, supposing the benefits attributed to it to be undoubted, anything more than a further step of improvement in mode of practice? Can it, looking at it particularly from the point of view of the military surgeon, be justly called anything approaching to a revolution in treatment?

Let us examine the matter a little more closely. In the treatment of wounds in field practice it has always seemed to me that, leaving on one side the acknowledged necessity for a comprehension of the special features of each particular injury, and a knowledge of the special requirements depending upon its particular nature, everything else of importance in the treatment might be summed up under two heads: purity and repose. Purity of air, purity of all the surroundings of the patient, purity of all local applications, the simplest being generally the best if only pure, and local rest. So far as these essentials could be secured, so far would morbid constitutional states be warded off, and local repair quietly and speedily effected. If we could only secure these essentials in the field to the same extent as they are secured in our best civil hospitals, then in field practice we should meet with equally successful results, like injuries with like, as the results obtained in those civil hospitals. But the great difficulty in field practice has always been to obtain even an approach to that amount of purity and repose which such a hospital as the one in which we are now assembled enables the patients placed in it to enjoy. Wounds in the field are usually inflicted on men whose surroundings can nowise be regarded as surgically pure, either at the time they are inflicted, or, as a rule, during their subsequent treatment. The men are wearing the uniforms they have been long toiling in, they are covered with perspiration from exertion and excitement, the air is filled with dust and debris caused by the movements of the troops, the tramp of horses, and the passage of guns and vehicles, or the surface of the ground is often a bed of slime and mud. The wounded in a great battle lie about for hours, it may be for a day or even two days, with their wounds exposed to all these hurtful influences. If the men who have fallen are removed more early to a dressing station, or conveyed to a field hospital, the transport can scarcely ever be accomplished without a serious amount of additional injury to the

complicated anatomical structures which have been wounded. And who that is acquainted with the state of things inseparable from the movable field hospitals of an army, owing to the limited amount of equipment of all kinds, and of skilled attendance relatively to the needs of the time, or that is usually found in the more stationary but still temporary hospitals in rear, can regard them as presenting those complete conditions of purity which thoughtful surgeons have always held to be not merely desirable, but even to be essential, for a perfectly successful repair of grave wounds?

Sufficient experience, however, has now been gained to show us that in spite of these sources of impurity, notwithstanding all the septic conditions to which the wounded are exposed, it is possible to obtain successes that have never been before obtained in military surgery, if antiseptic precautions be faithfully and fully enforced. The impurities, organic and inorganic, which are carried into the wounds by the projectiles, the impurities in the atmosphere surrounding them, the impurities that are inseparable from the use of barns and old buildings as improvised hospitals, can be neutralized by the antiseptic method of treatment. This being so, is it anything less than a revolution? Look at some of the facts recorded by the few surgeons who, as yet, have had the means of following out the treatment in the field, and who have followed it. Take, for example, its effects as regards gunshot wounds of joints, for they have ever been among the most serious wounds which military surgeons have had to deal with in field practice.

An incised wound of a joint is a very simple injury by contrast with a gunshot wound of a joint. Yet in such an apparently slight operation as the removal of a loose cartilage from the knee-joint, with so limited an incision as is required for its extraction, who that has been in the habit of performing it in old days as I have been, can forget the extreme importance which was attached to the perfect exclusion of air from the interior of the articulation? It was to this point that attention was chiefly directed during the operation. If air were excluded then and subsequently, the wound healed like any other simple cut; if air got admission, the wound was converted into one of great danger. Even a dislocation of a joint produced by excessive violence, with its ligaments torn, with blood extravasated and infiltrating the parts around, even with injury to bone, is relatively harmless if there be no open wound; let there be an external wound, and air admitted, we all know it to be a most dangerous injury,

dangerous not only as regards the limb, but also as regards the life of the patient. The whole of subcutaneous surgery is based on the principle of preventing the admission of air among wounded structures. But now, under antiseptic precautions, joints, in cases of need, have long incisions made into them by surgeons, air is freely admitted, and all this is done without hesitation, and without apparent risk. Such a change seems really marvellous. It is not a step forward in the direction surgeons were moving; it is entirely a new path that is opened up. In the case of a large articulation traversed by a bullet, impure air must pass along and enter with the projectile, some portions of the tissues are broken up, deprived of vitality, and forced into the adjoining structures, the whole wound is a contused one, the extravasated blood finds it way among the anatomical parts in the vicinity; yet under these septic and most unfavourable conditions, it has been found that not only the joint may be preserved without danger to life, but even the mobility of the joint restored, when the treatment planned by Professor Lister is strictly pursued.

I will only just refer to Professor Reyher's published experience as regards gunshot wounds of the knee-joint; time will not allow me to follow his experience in wounds of other joints, or in gunshot fractures of the shafts of bones, though the results in these equally tend to show the remarkable advantages that have been gained by the use of Listerism in their treatment. In Dr. Reyher's report there is a detailed table of eighty-one gunshot wounds of the knee-joint which were treated without amputation being resorted to in the early part of the treatment. Of these he had under his care eighteen cases that were treated antiseptically throughout, from the beginning to the close. Among these only three deaths occurred, while the remaining fifteen fully recovered. Not only the wounded limbs, but the mobility of the wounded joints were preserved in all these fifteen cases. In forty cases, which, according to Dr. Reyher's description, had been manipulated and operated upon in opposition to antiseptic principles before coming under his care, the deaths amounted to thirty-four. Six patients, therefore, out of forty survived. In five of these instances life was only saved after amputation of the wounded limbs; in one case only was the wounded limb preserved as well as life, and in this the mobility of the joint was lost. The remaining twenty-three cases were treated altogether without antiseptic precautions, and of these only one patient survived. Thus, in the cases in which Listerism was practised from the outset, the wound openings being merely

antiseptically occluded by an antiseptic compress until the arrival of the patients at the field hospital, the mortality was reduced to 16·6 per cent; in the cases treated partially only on antiseptic principles, the mortality was 85 per cent; in the twenty-three cases in which antiseptic treatment was not employed at all, the mortality was 95·7 per cent.

I need hardly say there have been instances of gunshot wounds of the knee-joint occurring in the field saved under former methods of treatment, but such cases, when there has been complete evidence of the interior of the joint being opened, have been rare and exceptional; and whenever they have occurred the patients have been subjected to the greatest risks during the treatment, while a fixed joint has been regarded as a remarkably good result in the end. I believe no instance occurred during the Crimean War in which the knee-joint was manifestly penetrated and the epiphysis of the femur or tibia fractured, where the wounded limb as well as the life of the patient was eventually preserved. Amputation, as a rule, was performed early, being regarded as essential to give the patient a fair chance of life in such cases, as it had been by the eminent surgeons of the Peninsular days from the experience they had gained during the early wars of the present century; and where it was not performed in the onset of the case it had to be resorted to subsequently, if the patient had not already succumbed to the constitutional effects of his injury. In the expedition against Kinburn a healthy young officer, under twenty years of age, shot himself in one of his knees by a small bullet from his revolver. The limited size of the wound, the absence of any evidence of injury to the bone surfaces (and, indeed, as afterwards proved, none existed), the youth and healthy constitution of the patient, made this a case in which it seemed justifiable to try and save the limb. Conservative treatment was therefore adopted, and every effort made to prevent inflammation in the joint by local means as well as constitutional treatment. But the too common results followed—inflammation, suppuration, and disorganization of the joint, and eventually death. Amputation was performed four weeks after the injury, but proved too late. This young officer had advantages that are not often to be obtained in field practice, for he was removed on board ship directly after the wound was inflicted, and had all the care and attention from the first that could be possibly given to one in his position.

Prior to the war of 1870 between Germany and France, Baron Langenbeck, of Berlin, advocated the conservative treatment of gunshot wounds of the knee-joint when the bones were not much

fractured as the proper mode, and during the war many such wounds were treated without amputation. The success, however, appears to have been very limited, although the treatment laid down by Langenbeck resembled in some respects the practice of Professor Lister. Air was to be excluded as far as possible, immobilization of the injured joint was imperatively enjoined, and carbolized dressings were to be employed. But it is one thing to attempt to exclude air; the admission of air after chemically destroying the septic qualities of its contents, as aimed at by Listerism, is quite another thing.

In some respects the condition of field hospitals in time of war is often not unlike what that of some foreign civil hospitals has been in time of peace; the great difference being that the state of things in the civil hospitals was a preventible one, while in the field the circumstances of warfare render it unavoidable. Soldiers lying in tent hospitals, without bedsteads to keep them off the ground; the air filled with dust and those organic elements on which, whatever their nature, putrefactive changes in animal tissues have been proved to depend, freely entering and settling on their coverings and their persons; scant means of ablution or cleanliness for them or their attendants; or subjected to the same noxious influences while lying on the floors of churches, outhouses, or old buildings in villages and towns; generally without any suitable appliances for the proper conservancy of the number of wounded patients lodged in them: these are common conditions in time of war, which surgeons, however alive they may be to the evils which result from them, are often powerless to avert. I have seen Continental hospitals, however, in large cities, centres of civilization, where the state of the injured sufferers lying in them was certainly as hazardous, if not more so, than that of the military patients I have referred to. Hospitals where, from the long-continued absence of adequate sanitary arrangements, every part of them must have been deeply impregnated with septic materials; where from the habits of the patients, from the habits even of the surgeons and attendants looking after them, it appeared nothing less than marvellous that any grave wound could follow a healing course and become repaired. Indeed, we know that so great has been the ratio of mortality in many of these Continental hospitals as compared with the mortality in most of our English hospitals, in which hygienic improvements had advanced with so much more rapid strides than they had abroad, and where the habits of persons in respect to cleanliness were so different, that many inquiries were instituted by Continental surgeons, and visits of observation to this country made, to arrive

at an explanation of the difference; and it is curious to note that, in some instances, so little were the visitors capable of appreciating the immense influence of sanitation in producing these results, they argued that the greater success of treatment in the English hospitals was due to the constitutions of Englishmen being more tolerant of injuries than those of their own countrymen.

The civil General Hospital at Munich, where Professor Nussbaum practised, was in the condition I have been describing. Sanitary defects of all kinds abounded in it. Every wound in it took on an unhealthy action. Erysipelas, pyæmia, and hospital gangrene were dominant. Almost every patient on whom an amputation had to be performed died. No important operation was undertaken, therefore, that could possibly be avoided, however advantageous it might be to the patient if it could be done with success. But then comes the startling fact that, without any change in the hospital itself, without any improvement in its sanitary defects, but with a change only in treatment—the adoption of Listerism—all these disasters disappear. Operations of the severest description, operations that would not have been contemplated previously, could now be performed with remarkable success.[1] Undoubtedly, under the new treatment there is a certain amount of cleanliness which probably was not much attended to previously. The hands of the surgeons are bathed, the instruments are cleansed; but with all the other unhygienic defects remaining, it is sufficiently obvious the mere washing of hands and instruments would have made no material difference in the general results. If the *avoidable* sanitary defects in such civil hospitals can be thus counteracted by a special treatment, is there any reason why the unavoidable sanitary defects in the surroundings of patients in time of war should not be counteracted by the same special treatment, if it can be applied to them? And if this can be done, will it not amount to such a radical change in our notions of what could be expected, almost of what we deemed

[1] My friend Dr. Renk, Assistant Professor at the Hygienic Institute of Munich, who at the request of the Bavarian, and with the consent of the British Government, went through the course of instruction in the Army Medical School at Netley, in 1876, and who was formerly one of the surgeons in the General Hospital above mentioned, has to-day (October 11, 1880) informed me that the above remarks convey the exact truth regarding it. He adds that while he was serving in it not even a whitlow could be opened without gangrene following, and in some instances fatal results, while since the antiseptic treatment has been introduced, neither hospital gangrene nor pyæmia has occurred in any single operation that has been performed within the building.

possible, in field practice, as to justify calling it a revolution in military surgery? It does not seem possible to ignore the facts I have mentioned. On the one hand, we see the septic conditions inseparable from the treatment of gunshot wounds in the field neutralized by a particular line of treatment, as proved by the experience I have partly quoted; on the other, the fatally unhealthy circumstances of notoriously unsanitary civil hospitals equally counteracted by the same mode of procedure.

At first sight it might appear that a real and serious evil would result from such success under the circumstances I have described. I mean that if unsanitary defects can be neutralized as regards their influence on open wounds by a special mode of treatment, surgeons may remain content with the continuance of these unsanitary surroundings. But no thoughtful surgeon can ever remain satisfied with such a state of things. Even if the local mischief can be repaired in spite of them, every good surgeon knows that the constitutional vigour of his patient will depend on good sanitation in all its thousand ramifications being properly maintained; and that as regards the treatment of other patients, patients labouring under constitutional diseases, the prospect of satisfactory progress and restoration to health with neglect of hygienic requirements must ever be delusive.

Whatever views, however, we may hold regarding the probable consequences of the adoption of Listerism, the facts as regards the results of the treatment on wounds remain unaltered by them. Their weight is not lessened whatever misuse might be made of the means by which the facts have been accumulated. The views advanced in explanation of their occurrence may be accepted or not. They still belong to the domain of theory. We may be unable to explain satisfactorily occasional recoveries under circumstances which would appear to be utterly subversive of every chance of cure if the views on which Listerism is founded be correct. We may be unable to explain, in the present state of our knowledge, the close resemblance between the fever and other constitutional symptoms induced by inflammation and progressive disease in a joint without an open wound, without exposure to the action of external agents of any description, and those induced by suppuration and destructive disease of the same joint consequent on an open wound, with exposure to the influence of aerial agents, be they germs or whatever else they may be; but so far as surgical practice is concerned, if trustworthy means for warding off the inflammation and its consequences in the case of the open-joint wound be discovered, no

one can surely hesitate to acknowledge that an immense and most advantageous stride in practice has been taken.

We are justified in asserting, I think, that the germ theory will explain a greater number of observations in connexion with Lister's plan of treatment than any other theory that has been advanced; but I do not think we are warranted in asserting more than this. If we plant an acorn in the ground, the tree that grows from it is an oak; the oak when it bears fruit produces acorns, which will reproduce trees of the same kind, and we know no other seed by which an oak can be reproduced than the acorn. We assert, then, that an acorn is or contains the essential germ of the oak. It is not necessary to determine how the first acorn was produced, through what successive changes oaks and their seeds may have been developed from other forms of vegetable life, though this may be a subject of philosophic speculation. We find the relation between the acorn and the oak an established fact, and we accept it as such. But no such complete facts have been established as regards organisms and their influence in causing irritation, inflammation, suppuration, septic changes in wounds and septic disorders. No special germs for producing these results have ever been satisfactorily demonstrated. The special germs of particular diseases have sometimes been supposed to be discovered, and especially of late there have been very remarkable observations in this direction; but we have no examples yet that have stood the test of repeated observation and thorough inquiry.

But leaving theory aside, so long as a particular course of treatment is found capable of producing beneficial results in the cure of wounds which no other kind of treatment has yet succeeded in producing, of saving more lives and of effecting a more easy, sure, and rapid repair of injuries, we are morally bound, it seems to me, in the interests of our patients, to follow it, if we can do so. If any other kind of treatment would enable me to open joints freely, and expose them to the air with the same amount of local and constitutional impunity, if I knew, under other treatment, of as many as fifteen out of eighteen patients with gunshot wounds of the knee-joint being saved without amputation, and not only this, but with the mobility of the joints restored, then I should have a choice between this mode of treatment, whatever it might be, and Listerism. But as far as published records go no such instance exists, and no such choice is open to me.

One of the difficulties which surgeons have had to contend against in the treatment of gunshot wounds has been the lodgment in

them of foreign substances, some of them of a very irritating and deleterious nature. I refer not merely to leaden or iron projectiles, but particularly to substances like fragments of stone, cloth, leather, and such still more hurtful objects as portions of contused and devitalized tissues, which are apt to be carried from one part of a wound to another in gunshot injuries. It is true that with the modern bullets of narrow diameter the lodgment of foreign substances does not occur so frequently as formerly; but as statistical observations during recent wars have shown, even with these projectiles, and still more with projectiles of other kinds, these complications still occur in a far larger proportion than might be thought likely to happen. Many examples in former days might be met with of smooth metal substances, as musket bullets, becoming encysted, and wounds cicatrizing notwithstanding their lodgment; but I myself never saw, and I do not know of other surgeons having seen, in former days, a wound into which a piece of woollen cloth from a man's uniform had been carried become soundly healed in spite of its continued presence. But even the presence of bits of dirty cloth in the deep parts of wounds, we are told by eminent German surgeons, has not prevented them, in many instances, from pursuing a favourable course, and becoming healed under antiseptic precautions. If further experience should continue to confirm these observations, I cannot regard the change in any other light than that of a revolution in military practice.

To ensure the necessary precautions, and to carry out the course of treatment comprehended under the general term *Listerism*, certain special appliances and kinds of dressings are required. What chemical agents and what forms of these agents, what description of dressings will best answer the purpose, and at the same time be compatible with the peculiar conditions incidental to military arrangements in time of war, is a subject which still requires a good deal of consideration; but if Listerism is to be followed in military surgical practice, a thorough investigation of it must be made. Whatever may be ultimately determined upon in these respects, an important change will have to be made in some parts of the equipment of our bearer companies and field hospitals. Some of the ingredients for the treatment of wounds will probably have to be abandoned as useless, and others introduced in their stead. Here, again, something like a radical change in the principles of selection of articles will occur. But supposing the ingredients of the equipment to be revised in accordance with the needs of Listerism, questions will still occur whether some of them can be preserved in

an efficient state for use for long periods, as articles for military purposes generally have to be; whether the equipment can be provided in quantity adequate to meet the needs of the probable numbers that will require it; or, if provided, whether the views of commanding officers and the necessities of military service in other directions, will allow it to be carried with the troops on active employ. The free access of air, and its frequently forcible movement, will be another difficulty in the way of acting chemically upon it in the vicinity of wounds which have to be treated in the field and in tent hospitals. And even if these impediments be overcome, it may still further be regarded as questionable whether a personnel will be found to apply the treatment with sufficiently due regard to the accuracy which it demands, especially amid the tumult and confusion incidental to a scene of conflict; or whether, as the wounded are pouring in, or in case of particular military events—with a retreating force, for example—there will be either time or opportunity for a treatment requiring such close observation and care. In no method of treatment are extreme accuracy and thought regarding the minutest details so essential. At the late meeting of the British Medical Association in Cambridge, I heard Mr. Lister remark on a point in the treatment, connected with the use of a drainage tube, which had until recently escaped even his observation, but which, in the particular instance that had called his attention to the subject, had, he believed, interfered with the aseptic progress of the case, and at one time had threatened to prevent its successful issue.

I cannot at present consider how the antiseptic treatment of wounds may be best carried out in field practice—either the best materials for the purpose, or the systems on which they may be best applied, so as to bring them into accord with other military arrangements; it would be out of place to do so in this introductory lecture, and I shall have to refer to these matters again in the future. I will only add now, that if the advantages of the Listerian plan of treatment of gunshot and other wounds be real—if the dangers and mortality of wounds and surgical operations are everywhere lessened by it under unfavourable conditions analogous to those which are commonly met with in field practice (and with the facts brought to our notice from all sides, I do not see how the truth of this can be longer doubted or gainsaid), then we must regard it as our bounden duty to make every effort to adopt it, until some other plan superior, or, at least, equal to it, is available; and although there may be apparent contradictions in regard to it, and although there are, undoubtedly, many and serious impediments in the way of its intro-

duction into military practice, we must hope that these contradictions will in time be reconciled, the impediments be overcome, and thus the soldiers of the army who may be wounded in their country's service in time of war derive the same advantages from it that are now so extensively enjoyed by thousands of patients in time of peace.

Reviews.

THE DIARY OF A SURGEON OF THE GRANDE ARMÉE. L.-V. Lagneau, 1803-1815. Edited by Eugène Tattet. Paris: Emile Paul. 1913.

The diaries of the great wars of the Napoleonic period have probably not yet all been published, and one of the more recent to appear is the "Journal d'un Chirurgien de la Grande Armée." The original manuscript was put at the writer's disposal by a grandson of Dr. Lagneau.

During Lagneau's eleven years' military service, he took part in twenty-two campaigns, and recorded his impressions from day to day in small notebooks in which he illustrated costumes worn by inhabitants, scenery, monuments, etc. Some of his notebooks were lost with his baggage at Wilna, and these gaps in the records he filled in subsequently from memory. There is unfortunately very little in the narrative about medical work; there is an occasional allusion to treating this or that officer wounded in a particular engagement, but practically nothing about collection, disposal, and evacuation of wounded. As a regimental surgeon he would be little concerned with the after-treatment of his cases.

The book is full of interesting foot-notes. A short descriptive account of the military career of nearly all the officers he mentions in his diary has been inserted in the foot-notes, and many of these are copies of letters which Lagneau received from Larrey, Percy, and other illustrious medical officers commenting favourably on his medical work and reports. So we must take it that while his diary was more of a personal nature, the professional work was being recorded in other documents.

Lagneau commenced his medical studies in Paris, at the age of 16. At the age of 20, having obtained his degree, he was called up for military service and managed to obtain a commission as a medical officer on October 10, 1803. He was posted to Ostend to the "Ambulances de l'Armée des Côtes," destined for the invasion of England. He describes his daily life there in cantonments where the medical officers of the army and fleet formed a medico-chirurgical society which met with Percy's approval. He describes how the 21st Light Regiment, which had come from Egypt and which contained in the ranks Egyptians, Copts, Abyssinians, and negroes, suffered a lot from pulmonary trouble and dysentery.

Lagneau's next move was to the 9th Regiment of the Line, also recently arrived from Egypt; its headquarters were at Strassburg, whither he proceeded to join. At Strassburg he was attached to the military hospital for duty, where he served under a principal medical officer who was at that time nearly 80 years old. Thirteen months later,

the regiment was ordered to Geneva. He has a word to say about each place they came to *en route*: at one place the ladies were beautiful; at another there was the story of a naughty old bishop of long ago; at another the wine was good and strong, and the drummers, having done themselves particularly well, took the regiment at a charging pace up the steep road leading to the next camp. From Geneva the regiment marched up the valley of the Rhone, over the Simplon into Italy, where our hero set himself to study Italian.

In October, 1806, Lagneau was appointed to the 12th Regiment of Dragoons, quartered somewhere in Germany. Leaving Udine, in Italy, early in November, 1806, he travelled by hired chaise through the Tyrol, Bavaria, and Saxony to Berlin, where he arrived about five weeks later, to find that his new regiment had gone on to Poland. He gives brief notes of the hostelries and private houses at which he put up on the way, and also of prevailing customs, monuments, and pictures which he saw *en route*. He mentions a painting he saw in a Tyrolean inn, depicting the "Flight into Egypt," in which the Holy Child wore a green hat bedecked with feathers and ribbons. In his travels he noted many similar anachronisms, including a Flemish painting of Abraham preparing to sacrifice his son with an old musket.

A large depot for the cavalry had been formed at Potsdam at which Lagneau left his heavy baggage before starting off to look for his new regiment. He found his regiment on February 1, 1807, and was just in time for the battle of Eylau. The battle is dismissed in a few lines; then follows an interesting entry: "We all bivouacked in the open, the villages being full of our wounded. Those from my regiment, after I had dressed them, joined the others for evacuation to Warsaw." There are other entries which follow that will remind any old campaigner of his own experiences in the field, such as: "15th and 16th February. Always on the alert. Our horses remain saddled every night." "18th February. This is the first time that I have slept with my boots off." At this period the dragoons appear to have fallen into some military disrepute, and Lagneau, as a doctor of dragoons, lays himself out to explain how it all came about. After Austerlitz an attempt was made to revert the dragoons to their original duties as mounted infantry, which apparently met with much disfavour amongst the older dragoons, who had no liking for "wearing gaiters," and who showed their dislike by getting back to the depots on the slightest excuse. After the battle of Jena, young soldiers were mounted on Saxon cavalry horses, and not having been sufficiently trained in riding and manœuvring did not always acquit themselves with credit during the Eylau campaign. Later on, they became excellent soldiers at mounted and dismounted work, with training, and with the addition of drafts of old dragoons who infused into the young conscripts "military tastes and habits."

Another entry a few months later gives one a good idea of a disturbed night's rest which might happen in any campaign: "Having spent a frightful night in deluging rain, some cuirassiers found a house in which we were sleeping quietly. It was a whole division which had arrived in the middle of the night and which fell like an avalanche on the camp or bivouac, which was already more than filled by the combined army. It is difficult to realize the state of confusion produced by thousands of men and horses who do not know where to get accommodation, or water for

soup, or wood, or straw, especially on a pouring wet night. It is an infernal row with shouting and fighting without end."

After the treaty of Tilsit, the regiment appears to have done a good deal of marching, stopping however at various places for several months at a time. On August 27, 1808, they were at Wesel on the Rhine and the following entry occurs: "The advantages which we have hitherto enjoyed in the conquered territory (board and lodging with the inhabitants, etc.) have come to an end, and it strikes me that the inhabitants are almost rude to the officers that they are ordered to find billets for. Perhaps they want their revenge. . . . . ."

In September, 1808, the regiment got back to Versailles and was inspected by the Emperor. Lagneau was decorated with the Legion of Honour by the Emperor, who asked him at the same time if he always kept his instruments in good condition and if he went on to the field of battle to dress his wounded. A week later the regiment was ordered to Spain.

In March, 1809, two regiments of dragoons found themselves in action against a Spanish force. The colonel commanding had his leg blown off by a cannon shot. He was conveyed to a village, where they wanted to amputate. The gallant colonel refused point-blank and threatened to shoot anyone approaching him for this purpose. He died five days later of tetanus.

The story in Spain is one of marches snd counter-marches, battles lost and gained, and rough estimates of casualties without any details.

In July, 1809, Lagneau was appointed to the Imperial Guards. Before starting from Madrid to take up his appointment he was detained for ten days while a convoy of wounded and of English prisoners for France was being got ready. He travelled with this convoy to the French frontier and then journeyed to Paris by post-chaise. He was ordered to proceed to Augsburg in Germany to join the Guards, but met them at Strassburg. They returned to Paris and very soon afterwards were ordered to Spain. They appear to have spent several months at Haro, where Lagneau rapidly acquiring a knowledge of Spanish became a recognized interpreter for his regiment. The hospital here was full of wounded and cases of typhoid fever, and in a very bad sanitary state. Lagneau got walls pulled down to make larger wards, the place white-washed and better ventilated, and by these means much improved the health of the sick.

In January, 1812, the young soldiers of his regiment in Spain were drafted into other battalions, and the regimental cadre consisting of the officers and non-commissioned officers was ordered back to Paris. Lagneau got permission to travel by himself as he was anxious to return to Paris to get a new edition of his book on venereal disease into print. After the arrival of this cadre of his regiment, Lagneau and his assistants had to set to work to examine the new conscripts selected for the Guards. This kept Lagneau very busy. They were shown over 6,000 men from whom to select 1,600. The Emperor often turned up to see the men, and used to ask Lagneau about their health and what means he had for detecting men malingering, such conditions as epilepsy, incontinence of urine, septic discharges from the ears, etc. The regiment being brought up to strength, they started for Mayence; Lagneau was allowed to remain behind to finish his book and caught them up in May, 1812.

The Russian campaign of 1812 has been so often and so fully described that one does not expect to cull much fresh information from a work of this sort. Lagneau describes how he and two or three Guards officers had the foresight to make a small tent out of some canvas that they found in Moscow. They were able to carry this the whole way with them, and it probably saved their lives on many of those awful cold nights when men went to sleep near their bivouac fires never to wake again. Apropos of their messing arrangements he writes: "My hospital cart was big and heavy. It was loaded with wine, rice, biscuit, sugar, coffee, and other provisions in small boxes or in sacks. The wagon had to be dropped and it was burnt. The provisions however were put into sacks and loaded on to the backs of the ambulance horses that remained. These provisions lasted us very well till we got to Wilna." The tent was carried on a small Cossack pony which subsisted on pine-tops and anything it could pick up.

There is an interesting entry with reference to the battle of Krasnyi, November 17, 1812, when Napoleon took the Jeune Garde back to meet Davoust: "I was employed dressing the wounded of my regiment when they brought General L. to my hospital, in the first house on the right on entering the village, and I was just getting ready to amputate his leg, when V., my colleague, came to tell me that the Guards were retiring, and in fact I saw our Field-Marshal Mortier at the head of the Corps. I went and asked him what I was to do with my wounded and amongst others with General L. He told me to evacuate all of them and to follow his troops. I had the general placed on a sledge which was accompanied by several of his sappers. I did likewise for the remainder of the wounded unable to march. I promised to meet them again at the next halt which we expected to be at Lyady. Unfortunately, we did not get there till half-past ten at night and I was unable to find out where my wounded were in the hubbub of the bivouacs, the fires, and the shouting of soldiers trying to find their battalions or their companies." Fortunately General L. and the others were found and taken care of by some other doctor.

On reaching Paris in January, 1813, Lagneau was transferred to the Fusilier Grenadiers of the Guard, and in April we find him back in Germany. Lagneau went through the trying campaign of 1813 and was present at the battle of Leipzig. In parenthesis he deplores the absence from this battle of 190,000 good men, who were garrisoning towns. He got back to Paris in November, 1813: "We are busy bringing the regiment up to strength with old conscripts who have not been called up before. Fine men, strong, well developed, and intelligent. They have also given us soldiers from various regimental depots. Altogether it is a good and reassuring complement."

In November, 1814, Lagneau left the service when the Guards depot at Fontainbleau was broken up. He then went to Paris where he resumed his studies and did some practice.

On the Emperor's return from Elba he was posted as chirurgien-major to the 3rd Regiment of Grenadiers of the Old Guard and on June 10, 1815, he was in the field again. He was at the battle of Ligny on the 16th. On the 17th he states that he saw Highlanders for the first time on the battlefield, and on June 18 he was present at Waterloo. At this battle Lagneau had a dressing station in one of the farm buildings

at La Belle Alliance, but had to evacuate it with his wounded under the fire of the advancing Prussians. He writes: "I was there with Larrey and Zinc, who had an ambulance. He also was obliged to evacuate and joined me in the group near the Emperor."

On September 23, 1815, Lagneau left the army and went into practice, where he was very successful, making as he says at least 18,000 francs a year. He died in Paris in 1868 at the ripe age of 87.

The book is full of interesting little episodes, and its perusal makes one wish that some similar diaries of our own service could be brought to the light of day. It is more than likely that they exist.

J. V. F.

SCROFULOSIS. By Professor Dr. G. Cornet. Translated from the second German Edition by J. E. Bulloch, M.D. London: John Bale, Sons, and Danielsson, Ltd. 1914. Pp. xi and 515. Price 15s. net.

This book shows, on the part of the author, a wide knowledge of the subject dealt with, and contains much information likely to be of use to medical officers of schools, school inspectors, and others concerned with the physical upbringing of children. Scrofulosis is defined as a complex of symptoms almost entirely confined to childhood and early youth, affecting the skin, mucous membranes, conjunctiva, and middle ear, the respiratory and digestive tracts, the glands, bones, and joints, and distinguishable from the non-scrofulous phenomena of the same situations by its persistency, frequent recurrence, and multiplicity. Such a complex may be caused by tubercle, the pyogenic cocci, or both together, scrofulosis being, therefore, a "pyogenous or mixed tuberculous infection arising from a special diathesis (predisposition)." With all respect to the distinguished author, we consider that the time is past for grouping a number of different diseases under one heading and elaborating for the symptom complex a system of prevention and treatment that cannot possibly have exact reference to every pathological factor concerned. Modern medical science demands, where possible, a specific diagnosis followed by specific treatment, and the attempt to place tubercular infections under the same category as pyogenic diseases is only likely to confuse the issue. For this reason we hold that such words as scrofula and struma are better forgotten. With this reservation, we find much of interest in the volume, though frequent faults in the rendering of the original into English tend to exasperate the reader. Some of the sentences are little short of amazing, as for instance, the following:—

". . . . the pus, which is to a certain extent properly a final product, engenders the bacteria which cause it" (p. 22).

There are useful hints as to open-air treatment and climatic health resorts, and much of the therepeutic advice will repay perusal.

S. L. C.

MIND AND ITS DISORDERS. A Text-book for Students and Practitioners. By W. H. B. Stoddart, M.D.Lond. Second Edition. Illustrated. Demy 8vo. Lewis's Practical Series. Pp. xvi and 518. Price 12s. 6d. net.

For the general practitioner, or medical student who intends taking up general practice, some knowledge of mental diseases is admittedly

necessary. Although he is not likely in the course of his work to require an extensive knowledge of these diseases, he will nevertheless find himself called upon from time to time to express an opinion, and to treat patients suffering from the earlier manifestations, a stage at which they can often be successfully treated if correctly appreciated. The appreciation is the difficulty out of which the practitioner too often seeks to extricate himself by the use of the blessed word "neurasthenia," the refuge of the ignorant and the abomination of the practical psychologist. If he desires to obtain such a knowledge of the mind and its disorders as will dissipate these clouds of uncertainty and doubt, a knowledge which will moreover be of value to him in every branch of medical work—for there is no such thing as separating into watertight compartments diseases of the mind and body—he cannot do better than read this book.

The author, in the preface to the first edition, states that his objects have been to provide a succinct account of the present state of knowledge of mental diseases and to endeavour to make his readers think neurologically of mental processes. While he is to be congratulated on his success in both respects, the latter is the feature of the book which takes it out of the category of the ordinary text-book on mental diseases. The present edition is brought well up to date. It is a book to be read through, not dipped into. A. K.

TROPICAL MEDICINE AND HYGIENE. By C. W. Daniels, M.B., F.R.C.P. In three parts, with coloured and other illustrations. Part I, Diseases due to Protozoa. Second Edition. London: John Bale, Sons, and Danielsson, Ltd. Pp. xv and 277. Price 7s. 6d. net.

The first edition of this book was fully reviewed in the Journal for April, 1910. In the present edition the author (for Lieut.-Colonel Wilkinson's name no longer appears on the title-page) has made some alterations in the arrangement, although the general plan of the book remains the same.

There is a rearrangement of the chapters on malaria, and the short section dealing with the flagellata is omitted. Chapter xi dealing with kala-azar has been improved by the addition of a short account of the infantile form of the disease. The succeeding chapter on Oriental sore has been brought up to date and is now illustrated by good photographs of types of dermal leishmaniasis. The chapter on intestinal protozoa is not as good as the rest of the book, and still gives a somewhat confused account of amœbiasis and hepatic abscess. The final chapter contains a résumé of prophylaxis in protozoal disease, giving in a more compact form some of the information previously scattered through the various chapters. The book has been distinctly improved and brought up to date, and gives in a moderate space a reliable account of the diseases due to protozoa. O. L. R.

MODERN ANÆSTHETICS. By Dr. J. F. W. Silk. London: Edward Arnold, 1914. Pp. xii and 200. Price 3s. 6d. net.

Dr. Silk has produced a most readable and useful book on the above subject.

In the first chapter he deals with the history and physical properties of the various drugs. In chapter ii he describes the phenomena of

anæsthesia, dealing very clearly with the causation of shock. Crite's and Yandell Henderson's views are not regarded as antagonistic but rather as complementary. Chapter iii is devoted to the preparation of the patient, on which he lays great stress, and to the choice of the anæsthetic, in regard to which he believes the condition of the patient is the most important guide. He seems to be generally in favour of chloroform given by the open method, and considers that, on the whole, it is safer in heart disease with failure of compensation than ether, as the risks of over-stimulation in that affection are greater than of depression. In abdominal operations he is decidedly in favour of chloroform. Chapters v and vi deal with the method of administration, chapter vii with the difficulties and dangers, and chapter viii with exceptional operations. In chapter ix he discusses spinal and local analgesia. With regard to spinal analgesia he is in favour of its use in certain gastrostomies and in injuries and fractures of the lower extremities when it is necessary to obtain great muscular relaxation. He also considers that it should be used "in all big smashes of the lower extremities, whether an operation is contemplated or not; it should then be given as soon after the accident as possible, with the object of cutting off the shock impulses to the brain from the seat of injury." This is important from the military surgeon's point of view. F. E. G.

ALIMENTARY ENZYMES: IN THEORY AND APPLICATION. (With special reference to their use in treatment and dietetics.) Benger's Food Ltd., 1912. Pp. xi and 108.

Messrs. Benger's Food Company, Ltd., have with considerable enterprise published a small work on the alimentary enzymes, intended for the sole use of medical practitioners, but undoubtedly the book will be of value to all who are interested in the problems of dietetics. The work has been based largely on questions put to the firm from time to time, and is an attempt to present the necessary information in a connected form. It is pleasing to note in the preface that such inquiries are welcome, as manufacturers of proprietary foods are themselves especially qualified to give information which is only too acceptable and of great assistance to the scientist, and it is so often desirable that both should work in harmony.

The book opens with a clear résumé of the physiology of digestion and the digestion of cereal materials, and there are also included many useful hints and formulæ for the feeding of infants and the use of Benger's food generally, which cannot but be of value to practitioners. There are also some excellent photographs showing the effects of an artificial gastric juice on milk, etc. Benger's food is widely known and generally used, but is probably not always prescribed in the most scientific manner, and thus some of the valuable effects may be lost. The mass of information given in this book is well worth careful consideration, and there is much to be learnt which should be remembered when administering a proprietary food of this nature. W. W. O. B.

Current Literature.

Salvarsan.—In celebration of the 60th birthday of W.G.R. Professor Ehrlich the *Münch. med. Woch.* of March 10, 1914, devoted a substantial proportion of its space to the subject of salvarsan. The contributions, which include papers by Gennerich, Dreyfus, Leredde, Wechselmann and Eicke, and Iwaschenzoff, afford an interesting insight into the present position of salvarsan as regards its therapeutic value and the methods of employing it. As will be seen from the summaries detailed below, the views of the authors differ considerably as to the best methods of using salvarsan, but all are agreed that the earlier treatment is commenced the less difficult the problem of curing the disease, that, in fact, it takes just about twice as much treatment to cure an early secondary case as an early primary, and that cases later than these require considerably more than either. Another point which is clear is that we have departed very far from the original ideal that one dose of salvarsan was sufficient to cure syphilis, and the trend of opinion is that in early primary and secondary cases the important thing is to reduce the possibility of relapse to a minimum by giving an excess of treatment rather than otherwise in the first course or courses, since relapse cases are much more difficult to cure than early ones.

Gennerich divides his report into three periods: The first, from June, 1910, to March, 1911, is the period of intramuscular injections as well as intravenous. The second, from March, 1911, to March, 1912, includes the introduction of combined treatment, the removal of errors of technique, such as stale distilled water and saline, and an increase in the amount of treatment considered to be the minimum. The third, from March, 1912, to March, 1913, marks the development of the plan of treatment now in use, and perfection of the methods of observation, which now include, in addition to regular Wassermann tests, the periodical examination of the cerebrospinal fluid. No case is included in the non-relapse series which was under observation for less than a year, but all cases of relapse, even those which received less than the standard minimum amount of treatment, at whatever time they relapsed, are included. As the observation includes Wassermann tests after one or two provocative injections at least a year from termination of treatment, and in most cases examination of the cerebrospinal fluid at the same time, it will be seen that the standard of cure is a very high one. The results are as follows: Total cases treated from July, 1910, to March, 1911, 161, of which 114 were under observation for a year or longer. Out of 39 primary cases, 5 relapsed, 5 were reinfected, and 29 remained free from signs, 22 of these being under observation for 2 to 3¾ years. The 5 reinfections occurred 9, 9, 16, 24, and 36 months later. Out of 38 early secondary cases treated in the same period, either with 2 to 3 salvarsan local injections and 5 calomel injections, or, later, the same number of intra-muscular and 2 to 5 intravenous salvarsan, with 10 to 12 calomel injections, 18 relapsed. Of the 20 which remained free from signs, 19 were under subsequent observation for 2 to 3½ years. All the relapses occurred within a year, and the less strenuous the initial treatment, the earlier the relapse. All the relapses were serological.

Out of 8 late secondary cases, 6 relapsed, all serologically after 2 to 3 intramuscular and 2 intravenous salvarsan, and 6 to 12 calomel injections. Five of the relapses occurred within a year, but the sixth, though negative after a provocative injection at the end of twelve months, was positive after a provocative at the end of 2½ years, and the cerebrospinal fluid then showed marked pathological changes. The author remarks with regard to this case that though we can count on a cure if the serum of an early case is negative after a provocative at the end of a year, this does not follow with later cases. Out of 9 tertiary cases 3 were treated with 2 to 3 intramuscular salvarsan injections, 3 with a course of intramuscular salvarsan followed by a course of intravenous, 1 with 3 courses of salvarsan, and 2 with an initial course of intramuscular followed by 3 to 4 intravenous salvarsan on the rapid occurrence of a relapse. Three cases relapsed clinically, 1 died of apoplexy six months after a very mild course, and 5 remained free from signs during a period of 2 to 3½ years. Out of 20 latent cases which had previously received a varying amount of mercurial or salvarsan treatment, 8 relapsed, 7 serologically and 1 clinically. The latter occurred three months later, and of the 7 former, 3 occurred only after a provocative injection.

From March, 1911, to March, 1912, 320 cases were treated, of which 177 were under subsequent observation for a year or longer. Out of 71 primary cases who were treated with 5 to 8 intravenous injections of 0·4 to 0·5 grm. salvarsan (0·2 to 0·3 grm. for women) at intervals of a few days, and 10 to 15 calomel injections, 65 cases remained free and 6 relapsed. Two other primary cases treated in the same period did not receive as much as the above treatment and both relapsed. All the relapses occurred within the first year, and all were serological except one, a case of re-induration which occurred after three months. Excepting the 2 cases which received only 2 to 3 salvarsan injections all the relapses had a positive Wassermann reaction before treatment was commenced, and the author here expresses the opinion that such cases should be counted and treated as early secondary cases. The early secondary cases were treated at first with 3 grm. and later with 5 grm. salvarsan divided into the doses mentioned above. The change to the larger dose was made owing to the observation that after the abolition of febrile reaction which followed the use of freshly distilled water the salvarsan did not act so powerfully, being excreted more quickly, and to make up for this the dose was increased. As a rule, in the cases treated in the latter part of this period the salvarsan was administered in 2 courses of 6 to 7 injections with an interval of 28 to 33 days between the courses. One feature of the treatment of early secondary cases was the administration of 6 to 8 injections of calomel before commencing with salvarsan. The idea of this is to avoid a dangerous Jarisch-Herxheimer reaction in the brain, since at this stage the majority of secondary cases show meningeal changes. Of the 77 cases, 10 relapsed, but 1 of these had received only 3 injections of salvarsan. Six of the others had received only the first course, and in two others the individual doses were smaller than those mentioned above. Of the relapses one developed facial paralysis, the only case of neurorecidive in the author's series; another showed changes in the cerebrospinal fluid, with negative reaction of the serum a year later, and the

remainder were all serological. All the relapses but one occurred within a year. Out of 17 cases of late secondary syphilis treated for the most part with 2 to 3 courses each consisting of 6 to 7 salvarsan and 15 calomel injections, according to the amount of previous treatment, 5 relapsed. Four of these were serological, and 1 had fluid changes 2 years later with negative serum. Out of the 12 cases which remained free from relapse, 10 were under observation for 2 to 3 years. Out of 12 tertiary cases which received from 2 to 5 courses of salvarsan and calomel, 1 case relapsed serologically and 11 remained free in periods of 1 to 2½ years.

Out of 37 latent cases which received not less than 3 and often many more combined courses, 5 were still under treatment for persistent changes in the cerebrospinal fluid after 5 to 7 combined courses. Of the remaining 32, 4 relapsed, all serologically and after provocative injections, and in two of these the cerebrospinal fluid showed changes.

In the third year, from March, 1912, to March, 1913, 350 cases were treated, of which 201 remained sufficiently long under observation. In this year the systematic examination of the cerebrospinal fluid was introduced, this being carried out two to three times during the period of treatment and twice subsequently at intervals of a year to a year and a half. With regard to this systematic lumbar puncture, the author remarks that he has carried out 1,300 without the least disturbance. A disturbing factor in the opinion of the author was the introduction of neosalvarsan, under the use of which he witnessed the two first clinical relapses with secondary signs which he had experienced from the first year, when he was giving only two to three small salvarsan injections. He is therefore decidedly of opinion that neosalvarsan is not so potent therapeutically as the older remedy. Out of 92 primary cases treated with a course of 6 to 8 salvarsan and 15 calomel injections, and in cases where the Wassermann reaction was already positive, a follow-up course of 2 to 3 salvarsan injections after an interval of 2 to 3 weeks, 89 remained free from signs and 3 relapsed. Of the relapses, 1 gave a positive Wassermann reaction after six months and 2 showed slight changes in the cerebrospinal fluid with a negative Wassermann reaction of the serum. In these cases, therefore, the relapse would not have been detected without a lumbar puncture. The secondary cases were treated on much the same lines as in the second year except that, with a view to avoiding severe cerebral reactions, individual doses were rather diminished in many cases, and the course correspondingly prolonged. In cases where the Wassermann reaction quickly became negative and it was possible to raise the dose to 0·4 or 0·5 grm. a total of 10 to 12 salvarsan injections sufficed, but in those where only 0·4 or less had to be given, a second course of 4 injections of salvarsan commencing thirty days after the eighth injection of the first course, and a third course of 2 to 4 injections commencing three to four weeks from the end of the second, was usually given. Generally, no calomel was given in the second course, but if an interval of 6 to 8 weeks had elapsed from the last calomel injection of the first course to the beginning of the second pause a further course of 6 to 8 calcmel injections was given during this pause in the salvarsan injections. Out of the 70 early secondary cases 4 relapsed; 3 of these had been treated partially with neosalvarsan, while the fourth developed a positive

Wassermann reaction eight months later. In this case an interval of three months had been allowed to elapse between the first and second courses, a practice which the author condemns. The late secondary cases in this period were treated with a number of courses consisting of 6 salvarsan and 10 to 12 mercurial injections, the interval between courses being 7 to 9 weeks, and the number of courses determined by the effect on the cerebrospinal fluid. Out of 11 cases this was rendered completely normal in 4 by 3 to 5 courses, and the author considers the results much better than in previous years. Out of 43 latent cases treated on the same lines with 2 to 5 combined courses, 42 remained free from relapse, while 1 which had received only two courses developed a positive Wassermann reaction with considerable changes of the cerebrospinal fluid a year later. The author considers, therefore, that not less than 3 courses should be given to such cases.

In illustration of the importance of avoiding a relapse, out of 52 cases which came up for further treatment either on account of clinical signs (12 per cent) or positive Wassermann reaction, the cerebrospinal fluid was examined in 30 and pathological changes found here in 27, while out of the remaining 22 which were examined in this respect after one or two courses of salvarsan, 5 showed pathological changes in the fluid. It appears to the reviewer that this fact will have an important bearing on treatment in future. Undoubtedly a much smaller amount of treatment than that mentioned above is sufficient to render the majority of early syphilis cases permanently (as far as we can judge at present) negative, and were it not for the risk to the meninges, etc., it would be considerably more economical to give the smaller course and make up one's mind to a rather larger percentage of relapses; but in the light of Gennerich's investigations such a line of action appears to be fraught with too much risk to the patient. At the same time it is a comfort to remember that by no means ninety per cent of syphilis cases developed clinical signs of syphilis of the central nervous system even under the less efficient mercurial treatment, though here also laboratory observations proved that a very high percentage of secondary cases showed changes in the cerebrospinal fluid.

Amongst other points of interest in this valuable paper is the record of 17 cases of reinfection amongst the 1,200 cases treated on the above plans. As to untoward incidents, there were 2 deaths, the first from embolus and the second from ulcerative stomatitis, enteritis and dermatitis. Without going into details, the author expresses himself as pleased with the results of his endolumbar injections of neosalvarsan with which he has treated 67 cases without ill-effect, and he recommends that all cases which show signs of severe cerebral or spinal syphilis should be treated with an endolumbar injection of 6 to 8 c.c. of a solution containing 0·15 grm. neosalvarsan in 300 c.c. salt solution, the weak solution of neosalvarsan being mixed with an equal quantity of cerebrospinal fluid immediately before injection into the spinal canal.

G. Dreyfus (*ibid.*) contributes a paper on the results of three years' experience with salvarsan in the treatment of syphilis of the central nervous system, including tabes. The cases are divided into 24 early syphilis of the central nervous system, including neuro-recidives, 125 cases of late syphilis of the central nervous system, and 77 of tabes. The treatment recommended for each of these conditions differs. The

general precautions to be taken include most careful previous examination of the patient, and the greatest care in cases with granular casts in the urine, those with an amount of albumin which can be measured, patients over 60 years of age, those with cerebral endarteritis, those with lesions closely related to vital nerve centres, and cases of early syphilis of the central nervous system. In general, salvarsan is preferred to neosalvarsan as being more active, but the latter is used in cases where it is particularly important to avoid reaction. The success of these measures is shown in the fact that although the cases treated were for the most part considerably older and in worse health than those with which the syphilologist usually has to deal there was no death in over 3,000 injections. Only one case gave rise to anxiety, a patient who developed severe meningeal symptoms two days after an injection and was ill for fourteen days. It is noted that the same patient received the same dose six months later without ill-effect and is now practically free from trouble of any kind. The treatment laid down for cases of early brain syphilis, including neuro-recidives, is as follows: After lumbar puncture a course of ten days' mercurial treatment, either by inunction of 3 to 5 grm. daily, or intramuscular injections of grey oil or calomel (0·03 to 0·05 grm. of a 40 per cent suspension) every third day. Salvarsan is commenced only when the mercurial injections are not followed by the slightest rise of temperature, and then 0·15 grm. neosalvarsan is given. If this is followed by no rise of temperature 0·3 grm. is given on the following day, 0·45 grm. on the third, and 0·6 grm. on the fifth day. If any injection is followed by a marked rise of temperature the following dose is not increased. While giving neosalvarsan mercury is not administered. After from 1½ to 2 grm. neosalvarsan has been given in this way salvarsan is commenced, with mercury, 0·1 grm. of the former being followed by a slightly larger dose on the following day, and so on, giving injections every day or two and gradually increasing the dose to a maximum of 0·4 grm. The amount to be given varies according to the behaviour of the case, whether the cerebrospinal fluid returns to normal or not, and also whether the patient would be able to undertake a second course at the end of six to eight weeks if the spinal fluid were then found to show pathological changes. If the case does well and is willing to remain under control 4 to 5 grm. salvarsan are considered sufficient for one course. Otherwise the injections have to be continued. Thus in one case which showed severe changes in the spinal fluid 6 to 8 grm. salvarsan and 2 to 3 grm. neosalvarsan were given, the fluid after this being completely normal. At the end of six to eight weeks from the termination of the first course it is important to examine the spinal fluid and repeat the treatment if this shows the slightest change. The author lays great stress on giving injections in rapid succession, at 1 to 3 or at most 3 to 5-day intervals. Longer intervals than this endanger the success of the cure.

The following is generally the plan followed in cases of cerebral syphilis of a tertiary nature. After lumbar puncture the patient spends two or three days in bed without any treatment. On the first day of treatment calomel or grey oil is injected (0·03 grm. of a forty per cent suspension), and on the third day 0·05 grm. On the fifth day 0·2 grm. salvarsan, on the seventh 0·3 grm. salvarsan, on the ninth and eleventh days calomel or grey oil, on the thirteenth and seventeenth days 0·3 to 0·4 grm. salvarsan, and so on

for six to eight weeks, till a total of 4 to 5 grm. salvarsan has been given. Lumbar puncture at the commencement of the treatment is indispensable, and, speaking generally, the greater the pathological changes in the fluid, the greater the effect of the treatment. When the fluid shows no changes, except in endarteritis, it indicates that active processes have come to a standstill and little can be hoped for from specific treatment.

The clinical results of the above treatment were excellent, almost all cases showing either complete disappearance of symptoms or very marked improvement. Nevertheless, out of 125 cases the spinal fluid was rendered normal in only three. In many of the cases which were watched for from two to three years the changes in the fluid were the only signs which remained to show that the patients were not completely cured. The author recommends a fresh course every three months till not less than three to five courses have been given. The cases of tabes, which were in almost all stages, were treated as follows: Salvarsan 0·1 to 0·2 grm. every second or third day for four or five doses, when the dose was increased to the maximum of 0·3 grm., which was given every two to three days. Mercury was given with great caution on account of the intolerance of many tabetic patients to this remedy, and was only commenced when the patient had received from 1 to 2 grm. salvarsan. The choice of the mercurial preparation depended on the patient's tolerance, one being tolerant of one preparation and another of another. By advancing very cautiously in the manner described a crisis was very rarely provoked, but even if such should happen the injections of salvarsan should be continued. The author remarks that salvarsan has often been given up much too soon on account of the occurrence of crises when perseverance with the treatment would have resulted in eventual benefit. The amount of salvarsan to be given in one course is 4 to 5 grm., and in subsequent courses 3 to 4 grm., the intervals between courses being from two to three months, and four to six courses being given.

The results were as follows. Out of 35 cases which suffered from lightning pains, 20 were very markedly improved, 14 improved, and 1 not benefited. Out of 9 cases suffering from headache, general neurasthenia, bladder disturbances, perforating ulcer, etc., 3 were considerably improved, 4 were improved, and 2 received no benefit. Out of 18 cases in the ataxic stage 5 were considerably improved, 7 improved, 3 were not improved, and 3 became worse. Out of 15 cases which suffered from crises, 7 were considerably improved, 5 improved, and 3 received no benefit. Without going into details the author refers to cases which were restored to work and others which were almost completely relieved of the misery of severe lightning pains or frequent gastric crises.

Leredde (*ibid.*) writes on the sterilization of syphilis with salvarsan. Unlike most other workers, but in agreement with Wechselmann, he considers that it is better to stick to salvarsan rather than treat with salvarsan and mercury. The first two doses should be very small (0·15 grm. neosalvarsan) and the interval between them not less than seven to eight days. After this the dosage is considerably increased. The following is an example of the treatment prescribed: injections at weekly intervals of 0·15, 0·20, 0·3, 0·6, and 0·9 grm. neosalvarsan; three weeks' interval followed by injections at weekly intervals of 0·9, 0·9, and 1·2 grm.; interval of three weeks followed by injections of 0·9, 0·9 and 1·2 grm. neosalvarsan. This method of short courses with three-weekly intervals is that usually

recommended for earlier cases. At other times the following may be prescribed. Injections at weekly intervals of 0·15, 0·2, 0·3, 0·6, 0·9, 1·2, and 1·35 grm. neosalvarsan, followed by three weeks' interval and then weekly injections of 0·45, 0·6, 0·9, and 1·2 grm. neosalvarsan. The treatment must be controlled by blood test and lumbar puncture, the spinal fluid being examined as soon as the blood is negative to both original and Hecht tests. A provocative injection is given a month after the fluid and blood have been found completely normal and the blood must be tested four times between the fifth and thirtieth days after the provocative. A second lumbar puncture must be made two months after the first. As to the rest, the only certainty of cure lies in early treatment, though considerable benefit follows the use of salvarsan in all cases. He has had cases of tabes where the spinal fluid has become normal after thirty to forty injections given in short courses, with short intervals between the courses.

Iwaschenzoff (*ibid.*) writes of the good which follows the use of salvarsan in most cases of syphilis of the central nervous system. In general he advocates long courses of small doses (0·2 to 0·5 grm. salvarsan) at eight-day intervals.

Wechselmann and Eicke (*ibid.*) contribute an article on the technique of subcutaneous injection of neosalvarsan, which they consider effects far more than intravenous injections of salvarsan. Their experience is based on 7,000 such injections. The chief point is to inject the remedy into the tissue immediately overlying the fascia, where the connective tissue ground substance is in greatest quantity and the remedy can come into closest relation with the lymphatics and blood-vessels. They point out that absorption from the muscles is difficult on account of the lymphatic distribution. From 0·3 to 0·45 neosalvarsan is dissolved in 0·5 c.c. of 0·7 per cent salt solution. The syringe is first filled with saline and the needle pushed in under the skin as far as the fascia, which is recognized by its harsh feel at the point of the needle. If the needle is not far enough in, when the syringe is twisted round its long axis the tissues are twisted with it; the needle should then be pushed further in. The fact that it is in the right spot is indicated by the needle being freely movable, and when salt solution is injected and the syringe removed the salt solution returns in part through the needle. In some cases only subcutaneous injections were given at weekly intervals till about 1·8 grm. had been given in about thirty-eight days. In others intravenous injections of salvarsan were also given, the total of each being from 1·8 to 2·4 grm. Treatment was continued till the blood serum was negative when tested with three extracts and to tests carried out in two institutions.

Wechselmann, in a paper read before the Berlin. med. Gesellschaft on March 4, 1914 (*Berlin. klin. Woch.*, March 23, 1914) gives extensive reasons for his preference for pure salvarsan as opposed to combined mercurial and salvarsan treatment. In illustration of the safety of salvarsan he mentions that he has had no death due to salvarsan in over 45,000 injections and quotes from Jamin's thesis the proportions of deaths to injections which have happened in the successive years since salvarsan was introduced. These were in 1910, 16 deaths for 50,000 injections; in 1911, 92 for 800,000 injections; in 1912, 66 for 1,200,000 injections; and in 1913, 37 for 2,000,000 injections; showing that the proportions of

deaths to injections have steadily decreased with improvements in technique.

Wechselmann states his belief that it is often the mercury which is given in the combined course which is responsible for the death, and quotes instances of hæmorrhagic nephritis which followed mercurial treatment. Since the kidney disease may remain entirely latent up to the last, or be detected only by the most exact methods, it is easy to see how an injection of salvarsan in such a case may precipitate the gravest symptoms. With regard to cases of hæmorrhagic encephalitis which have occurred after salvarsan injections, he points out that such conditions occur in syphilis apart from salvarsan and he does not believe that in cases where they occurred after salvarsan the brain was normal beforehand. Guided by the blood test and, if necessary, the examination of the spinal fluid he has not hesitated in older cases of syphilis to give from forty to fifty injections of salvarsan in a year. Quoting Fournier's statistics, which showed that out of 4,400 cases of syphilis in pre-salvarsan days 1,500 showed tertiary signs within the first four years, he mentions that he has yet to see his first tertiary case amongst the patients he has treated with salvarsan. The treatment of a case of secondary syphilis is detailed to illustrate his procedure. In this case 4·9 grm. neosalvarsan was given subcutaneously and 2·4 grm. salvarsan intravenously in the course of ten weeks. During this time the blood was examined fourteen times and the cerebrospinal fluid once. L. W. H.

The Effects of Nitrogen Peroxide on the Constituents of Flour in relation to the Commercial Practice of Bleaching Flour with that Reagent (*Journ. of Hygiene*, vol. xiii, No. 4, January, 1914.)—The authors (Benjamin Moore, M.A., D.Sc., F.R.S., and John T. Wilson, M.D., D.P.H.) have investigated this problem and arrived at the following conclusions:—

"(1) Bleached flour is not known to be bleached by the great majority of those who consume it.

"(2) There does exist a demand for whiteness in flour, and previously to the advent of bleaching this was based on a real difference between white superfine flour and the cheaper yellower flour called 'household' or 'bakers'' flour.

"(3) The difference consists in this, that the superfine contains the ripest and best part of the flour or 'cream of the wheat,' while the lower grade consists of less ripe or less developed endosperm and is richer in oil which contains the colouring matter carrotene, and so is yellow in colour.

"(4) Bleaching by decolorizing the carrotene removes a criterion of quality between the two grades of flour and allows the cheaper quality to be admixed with the dearer, and the whole to be sold as first quality.

"(5) That this admixture is made possible is shown in two ways: First, the sellers of the bleaching apparatus advertise in milling journals that the process enables the miller to increase his 'divide,' and secondly, there are minute microscopic particles of offal in the products of the lower machines which are not bleached or altered in the process, and which serve the microscopist as a guide to how the flour has been blended. Examination of commercial flours shows clearly that a large

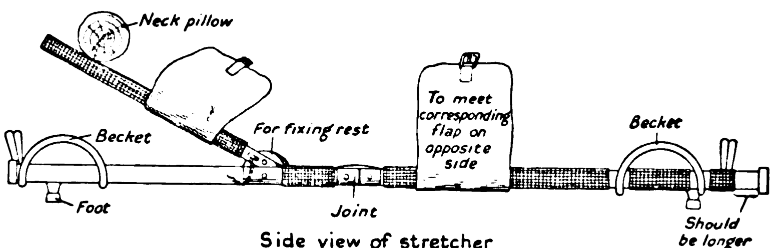
number of high-priced flours are such mixtures and could not be sold as such unless previously bleached.

"(6) Bleaching confers no advantage in nutritive properties or flavour upon the flour, and the large sum spent upon bleaching flour is really a national waste.

"(7) Bleaching flour with considerable amounts of nitrogen peroxide alters both fats and proteins by nitrating them. Although the changes at the level of commercial bleaching are small, there is no knowledge as to how the small amounts of organic nitro-bodies formed may affect the human body in prolonged use for years, and as there is no counter-balancing advantage, and an addition also to the price obtained by simulating a superior article, it is suggested either that bleaching should be prohibited, or regulated and notified clearly by label to the purchaser.

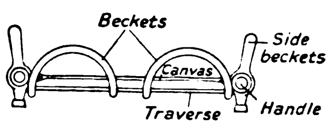
"(8) Bleaching by nitrogen peroxide is not a more rapid achievement of a slowly occurring natural process, but is essentially distinct. For while natural whitening in pure air consists in an oxidation of the colouring matter, bleaching consists in the formation of additional compounds between nitrogen peroxide and the colouring matter."

A New Stretcher devised by Stabsarzt Dr. Krause. — This stretcher, which is described in the *Rote Kreuz*, February 8, 1914, is 180 cm. long and 50 cm. broad. The poles are made of oval-shaped steel tubes with a folding joint in the centre. The handles can be shoved



Side view of stretcher
Scale 1/16

Length of stretcher 5ft. 11 in.
Width 1ft. 10 in.



End view of stretcher
Scale 1/16

in or pulled out as required; and are fixed in position by means of pins. The stretcher rests on short rubber pads. There is an adjustable back-rest with a laced-on neck cushion; the back-rest is adjusted by means of a semicircular plate with holes and a pin attached to the stretcher-pole

by means of a chain or cord. The stretcher and back-rest are covered with waterproof canvas which is laced on. Leather covered beckets on the traverses allow of the stretcher being lifted when the handles have been shoved in. There are two pairs of broad canvas strips, with straps and buckles to fix across the chest and thighs of the patient to secure him in position. The weight of the stretcher is 15 kg.

The stretcher has been devised to fulfil the following conditions:—

(1) To fit on to any wheeled stretcher apparatus.

(2) To go through railway carriage doors.

(3) To be capable of being placed on the seats of railway carriages of the different classes without use of further apparatus.

(4) To fit into ambulance wagons.

(5) To be available for carrying sick up or down staircases in hospitals and private houses.

(6) To be a comfortable resting-place for sick.

(7) To be light, folding, and portable by one man when empty.

The advantage of a stretcher of this sort is that a patient can be conveyed by various means of transport on the same stretcher.

The diagram has been constructed by Lieutenant-Colonel H. E. R. James from two sketches appearing in the original article.

J. V. F.

A Report on the Medical Arrangements with the Allies in the First Balkan War.—Médecin-Major M. Cousergue, of the French Army, was sent out to the Balkans in December, 1912, to study the medical arrangements of the Balkan Allies, and his report (*Organisation et Fonctionnement du Service de Santé des Armées coalisées*) has recently been published.

The writer speaks well of the physique of the Bulgars and of their patriotism, mentioning the case of a man who had suffered for a long time from diabetes who insisted on going to the front and who had filled his haversack with medicines and diabetic biscuits.

The service clothing was of a neutral tint, but the amount in store was not sufficient to clothe all the men called to arms. Large stores of Turkish drab uniforms were captured at Kirk Kilisse and at Salonica and these were taken into use. The Bulgarian officers who went to the war in their brilliant uniforms very soon found it advisable to change into less conspicuous clothing. Some regiments had coloured facings; the continuous line of red shoulder straps formed by the men lying down to fire in action also made a conspicuous target and these were removed after a while. The Servians and Bulgarians, in addition to their boots, carried a national sandal, called "openak," which they wore when they got foot-sore, and as a result they had practically no men falling out from this cause. Each soldier carried an entrenching spade and when rushing forward under fire he used it as a shield for his head. The sanitary arrangements were of a very primitive order.

The writer deals at some length with the medical organization of the allies, but in many instances the theory could not be put into practice for want of personnel. He describes the hospitals in the home territories and enlarges on the great assistance rendered by the various foreign Red Cross societies.

While numbers of men knew how to apply the first field dressing, many arrived at the dressing stations without being dressed, although they carried their dressing.

The majority of wounded could not be attended to while fighting was going on, and attempts made in the early part of the war by doctors and medical personnel to work their way up to the firing line met with disaster. The wounded on the other hand made all sorts of desperate attempts to get to the rear, and the writer estimates that fifty-five to sixty per cent of the wounded found their way back to the dressing stations, either by themselves or assisted by a comrade. He quotes the case of a man who was shot at Tchataldja through the skull, involving complete loss of vision, arriving at a dressing station carrying on his back a man with a broken thigh who kept him on the right road. Men with wounds of the lower extremities often used their rifles as a crutch to get to the rear. Wounded who attempted to retire from their position in the trenches often had to suffer for it. Much of the work of the stretcher bearers had to be done at night, and as on the side of the allies they had no lamps the work was much hampered. The Turks used lamps and frequently drew fire, although from their movements it was obvious what their task was. This emphasizes the importance of some form of dark lantern.

Regimental dressing stations were usually four to five kilometres in the rear, out of range of artillery fire. The field hospitals were further back and usually in villages. One that the writer saw at Philippiadis had a small petrol motor which worked a dynamo providing electric light. As large numbers of wounded arrive at night sufficient lighting is most essential in field medical units.

The writer makes some interesting remarks about the competition between hospitals, especially Red Cross hospitals, to capture the interesting surgical cases. In some places the hospitals would even have scouts out to waylay the approaching convoys to make their selection, the result being that often men who had marched the whole way down country found themselves luxuriating in clean sheets and every comfort, while cases of severe illness were shunned by these people and had to be content with whatever treatment they could get in the less well-equipped hospitals. To make matters worse many hospitals gave up sending their requisitions for material and equipment through the proper channel, appealing directly to distinguished patronage whose word no one would gainsay, with the result that the distribution of comforts, gifts, and necessities was very uneven, favoured hospitals having a superabundance of everything while others were deficient in ordinary necessaries. The writer ventured these remarks to emphasize the importance of having everything under a central control to obtain an equal and just distribution of comfort for the sick and wounded.

A large mass of interesting figures and clinical notes have been carefully compiled in the chapters on statistics and gunshot wounds, and are well worth perusing.

The paper concludes with a summary of the lessons and conclusions to be drawn from the war as affecting the French army medical service.

J. V. F.

Surgical Experiences in the Balkan Wars, 1912-1913.—Dr. V. Massari and Dr. G. Kronenfels recently gave a lecture at the University in Vienna on their war experiences, which has been reprinted in the *Wien. klin. Woch.* for January 8, 1914. They touched on many subjects of importance in this lecture, some of which may be briefly mentioned.

It is important during war to retain sufficient hospital accommodation

in the towns for the civil population. In Sofia, beyond a few rooms reserved for maternity cases, there was practically no hospital accommodation available for women.

One of the lecturers had a hospital near Adrianople during the capture of that fortress, and needless to say they were worked almost continuously day and night. It was not until he had got rid of all cases fit for evacuation that he could settle down to the systematic treatment of the severely wounded left behind.

The following table classifies the various wounded which remained under treatment at Baba-Eski after the capture of Adrianople.

TABLE I.—BABA-ESKI. MARCH.

	Total numbers		Small-arm wounds		Shell wounds	
			Aseptic	Infected	Aseptic	Infected
Head	9	Soft parts ..	3	1	2	—
		Perforating	2	1	—	—
Face	16	Soft parts ..	8	3	3	—
		Bones ..	2	—	—	—
Throat	6	..	5	—	1	—
Thorax	36	..	29	2	4	1
Spine	4	..	—	2	—	2
Abdomen	7	..	7	—	—	—
Genitals	3	..	—	1	1	1
Pelvis	7	..	2	1	2	2
Shoulder	7	..	4	—	1	2
Upper arm	45	Soft parts ..	19	2	2	2
		Bones ..	11	3	3	3
Elbow-joint	2	..	1	1	—	—
Forearm	44	Soft parts ..	22	2	2	5
		Bones ..	5	4	2	2
Hand	81	..	34	23	7	17
Hip	1	..	—	—	—	1
Thigh	58	Soft parts ..	25	4	10	9
		Bones ..	—	4	—	6
Knee-joint	6	..	6	—	—	—
Leg	68	Soft parts ..	25	10	4	16
		Bones ..	5	4	—	4
Foot	64	..	8	30	4	22
Total	464	..	223	98	48	95
			$\underbrace{\hspace{2em}}_{321}$		$\underbrace{\hspace{2em}}_{143}$	
Frost-bite ..	60	..	321		143	

The other lecturer during this time remained at Sofia where he took many cases into his hospital which had been evacuated from Adrianople. He emphasized the difference in the condition of the wounds now seen compared with the earlier periods of the war; most of them had been properly dressed, and splints had been well applied so that infected wounds were now much less frequent than formerly. He, however, got quite a number of cases in which the wounds had been plugged with wool or gauze, which of course prevented natural drainage. He found one case wearing a plaster of Paris bandage under which the wounds had been

tightly plugged. A Russian doctor at Mustapha-Pascha was apparently one of the culprits.

He gives a table of the wounded he received into his hospital from Adrianople.

TABLE II.—ALEXANDER HOSPITAL, SOFIA. MARCH.

Distribution of wounds	Total	Injuries of soft parts	Bone injuries (including perforations)
Head	5	3	2
Face	5	2	3 lower jaw.
Shoulder	7	4	3 joint.
Thorax	10	6	4
Abdomen	4	1	3
Pelvis	7	5	2
Upper arm	14	8	6
Forearm	17	10	7
Hand..	42	—	—
Elbow	2	—	2 joint.
Thigh	18	16	2
Leg	23	17	6
Foot	17	—	—
Knee	5	—	5 joint.
Total	176		
Frost-bite	36	3 hand 3 leg 30 foot	
Contusions from shrapnel bullets	20		
Tetanus	2		
Grand total	234		

In June, 1913, the field and line of communication hospitals in Thrace were cleared, and many cases were passed through the hospital in Sofia. The lecturers had an opportunity of seeing a great many men who had been wounded in the early part of the war and who had been returned to duty. Others were sent to them to be examined as to their fitness for duty. They were of opinion that a great many men had been returned to duty far too soon. They mention five cases of damage to all three nerves of the brachial plexus with advanced muscular atrophy, the result of cicatrization after operation for aneurysmal varix of the axillary artery. They think that it is a mistake to be in a hurry to return cases as healed, and that some time should be allowed to elapse after a campaign before publishing statistics of results.

In the second Balkan war, thanks to a better medical organization, the wounded got back to the stationary hospitals much quicker, and, owing to the correct application of the primary dressings, the wounds were generally in a much more satisfactory condition.

Table III shows the number of cases treated in the Alexander Hospital in Sofia in July and August, the wound-distribution, and the number of aseptic and infected wounds.

The lecturers are shortly going to publish a report in detail on more than 2,000 cases which came under their care during the wars, but in their lecture they touched on the following points :—

Conservative treatment as far as possible.

Head Wounds.—21 out of 32 were infected and associated with abscess formation. Wounds were usually enlarged and splinters removed. Penetrating wounds with no reaction were left alone. Cerebral hernias took a long time to heal. In the earlier stages they used the thermo-cautery; later when the line of demarcation between healthy tissues and the protruding elements showed up definitely they removed them with the Paquelin. This process occasionally had to be repeated. They treated one case successfully which had a gap in the skull the size of a five-shilling piece. It took seven months to heal, and there was considerable loss of movement in the right leg. They think plastic operations for filling up the skull wounds should not be undertaken too early, the cicatrization of the granulations usually provides quite a good covering. Relapses must be expected even a long time after the case is reported cured, due to the formation of metastatic abscesses or meningitis. There will also be cases of traumatic epilepsy.

TABLE III.

Wounds by regions	Total numbers		Small-arm wounds		Shell wounds	
			Aseptic	Infected	Aseptic	Infected
Head	45	Soft parts ..	10	3	5	—
		Perforating	6	12	3	6
Face	23	Soft parts ..	6	2	—	3
		Bone ..	4	5	—	3
Neck	12	..	5	—	7	—
Shoulder	6	Soft parts ..	2	—	1	1
		Joint ..	2	—	—	—
Upper arm	87	Soft parts ..	39	4	7	3
		Bone ..	29	—	3	2
Forearm	33	Soft parts ..	11	2	5	4
		Bone ..	4	—	4	3
Hand	49	Soft parts ..	23	3	2	6
		Bone ..	9	1	—	5
Elbow-joint	6	..	5	—	1	—
Thorax	59	Soft parts ..	11	—	6	2
		Penetrating	38	2	—	—
Spine	7	..	—	7	—	—
Abdomen	38	Soft parts ..	6	—	—	—
		Penetrating	26	1	—	5
Pelvis	13	..	9	—	2	2
Genitals	11	..	—	4	3	4
Hip-joint	1	..	—	—	—	1
Thigh	118	Soft parts ..	52	20	6	20
		Bone ..	12	1	1	6
Leg	155	Soft parts ..	63	22	8	26
		Bone ..	18	3	3	12
Foot	62	Soft parts ..	18	12	2	17
		Bone ..	3	2	1	7
Knee-joint	18	..	10	1	2	5
			421	107	72	143
Total	743		528		215	

Neck.—Three wounds of the larynx got well without tracheotomy. Three other cases developed cicatricial stenosis some weeks after being wounded and required tracheotomy.

Thorax.—Empyema was more common in the first war. In the second war only two out of forty of their lung cases were infected, one after injury of the main left bronchus and one after a mild empyema which recovered after aspiration. Hæmothorax in most cases got well without interference. They propose to publish details of a case of subcutaneous prolapse of the lung and of a hernia of the lung which developed during convalesence after absorption of a necrotic piece of rib, a condition which they state has not yet been described in military surgery.

Abdomen.—They distinguish three classes of penetrating wounds: (1) those without any reaction, (2) those with circumscribed hæmorrhage in which absorption took place or in which local abscess formation occurred, and where operative interference was always successful, (3) those with diffuse peritonitis which usually came to hospital in a moribund condition.

Bladder.—Four cases with urine infiltration of the tissues. Two recoveries.

Blood-vessels.—Ten aneurysms including one of the superior gluteal.

Fractures.—For those of the upper arm they used Desseault as well as Velpeau for a fixation dressing with padding under the arm. They preferred this method to splints, because the doctor can apply the dressing without assistance, the patient holding the damaged arm with the sound hand in the desired position; the dressing is applied in a few minutes and the arm is kept in position by fixation to the chest. Finally they used a plaster Desseault with a large window cut in it, so that the wound could be dressed without disturbing the fracture. In most cases strong callus had been thrown out in three or four weeks and a useful arm without noticeable shortening was the result.

Thigh.—They did not use any extension apparatus. A plaster of Paris stocking was applied about the fifth day reaching from the foot upwards and fitted with a window for dressing the wounds. If they could not correct the shortening with a pull they gave an anæsthetic.

Leg.—They used Petit boots or Kramer splints and plaster of Paris.

Removal of Bullets.—Only those causing disturbance or those which were easily palpable were removed.

In concluding, they insist that one cannot be conservative enough in military surgery. Many cases on arrival in hospital which appear to present every indication for immediate operative interference show marked improvement even on the following day.

J. V. F.

Health Statistics of the Italian Navy for the Years 1909 and 1910.—A few extracts from the official publication, *Statistica Sanitaria Dell' Arnata*, may be of interest as showing the sanitary condition of the Italian Navy and the inherent proclivities of its personnel, which latter indicate to some extent those of the nation (compulsory universal service is in existence).

The ratio of days lost (being an index of constantly sick) per 1,000 of strength was 45·049 for 1909 and 45·665 for 1910, grouped under the following conditions:—

	1909		1910
Under treatment	27,231	..	26,138
Convalescents	5,963	..	4,718
Awaiting discharge	953	..	1,016
For re-inspection	1,890	..	3,721
Rejected on re-inspection ..	7,255	..	8,744
Deaths	1,777	..	1,328

In 1909 the admissions were 13,379, and 12,725 in 1910. A graphic chart is introduced showing the groups of diseases for the two years, from which the following extracts are made:—

Diseases per 1,000 of Strength.

	1909		1910
Febrile diseases (undetermined)	1·3	..	1·2
Infective diseases, epidemic or pandemic, principally acute	1·4	..	1·3
Infective diseases of endemic nature, principally chronic	2·3	..	1·7
Diseases of material change, defects and anomalies of development	0·53	..	0·8
Diseases of the circulatory and lymphatic system..	2·5	..	3·3
,, ,, respiratory system	3·6	..	3·5
,, ,, digestive and annexed organs ..	5·5	..	5·6
,, ,, genito-urinary organs	1·5	..	1·4
,, ,, eye	2·5	..	2·4
,, ,, ear and nose	0·81	..	1·5
,, ,, skin and subcutaneous tissue ..	1·1	..	1·4
Venereal diseases other than syphilis	7·6	..	7·1
Syphilis	3·8	..	4·2
Neurosis and psychopathy	4·2	..	3·8
Diseases of the central and peripheral nervous system	0·61	..	0·6
Lesions due to violence	1·9	..	2·3
Suicide and attempted suicide	0·12	..	0·28

Among the acute infectious diseases in 1909, there were 302 cases of influenza, 202 of mumps, and 126 of typhoid.

In 1909, 22 deaths occurred, of which 12 were from influenza,[1] 3 from measles, 2 from scarlet fever, 2 from varioloid, 2 from cerebrospinal meningitis, 1 from Mediterranean fever.

The graphic chart of the incidence of acute infective diseases shows:—

	1909		1910
Measles	0·18	..	0·14
Varioloid (modified small-pox) ..	0·02	..	0·003
Variola (small-pox)	—	..	0·002
Scarlet fever	0·07	..	0·05
Influenza	0·25	..	0·18
Cerebrospinal meningitis	0·075	..	0·013
Mumps	0·23	..	0·13
Typhoid fever	0·72	..	0·9
Acute rheumatism	0·79	..	0·9
Erysipelas	0·023	..	0·024
Beriberi	0·001	..	0·003

In 1910, 20 deaths occurred from these diseases, of which 16 were from typhoid, 1 from measles, 1 from scarlet fever, 1 from diphtheria, and 1 from Mediterranean fever. In this year there were 254 cases of influenza and 146 of typhoid.

The endemic infective diseases (this group includes malaria) account for 7 deaths, chiefly from tuberculosis. Diseases of the circulatory and

[1] Possibly misprint for typhoid, compare tables.

lymphatic systems account for 2 deaths, and diseases of the respiratory system, 8 deaths; diseases of the digestive system and annexed organs show the highest incidence after venereal diseases, and 17 deaths; appendicitis, intestinal obstruction, abscess of the liver, and diseases of the genito-urinary system account for 4 deaths. The group of venereal diseases (other than syphilis) shows the highest incidence, and an average duration of treatment of 33·1 days. Syphilis has an average duration of treatment of 41·52 days, and 6 deaths.

Discharges under the head of neurosis and psychopathy were as follows:—

Epilepsy	41	Melancholia	4
Mattoidism (borderland of insanity)	24	General paralysis	2
Imbecility	10	Stammering	2
Hysteria	8	Amentia	1
Convulsions	6	Mania	1
Neurasthenia	5	Paranoia	1

There were 2 deaths under neurosis and psychopathy, and 6 deaths under diseases of the central and peripheral nervous system.

COMPARATIVE INCIDENCE UPON SEVERAL CLASSES PER 1,000 OF EFFECTIVES IN EACH CLASS.

	1909	1910
Officers	116·97	96·96
Warrant officers	137·38	121·92
Petty officers	245·46	239·89
Other ranks	450·88	420·02

Among occupations, the *infirmieri* (sick-attendants) show the highest rate of incidence of disease; semaphore men the lowest.

The seasonal chart shows the sick-rate lowest in October; highest in December, January, and February; after which it declines to June, rising in July, and falling progressively to October.

According to age, the lowest sick-rate is amongst men over 40; the highest between 14 and 20. From 21 to 30 it is even, except that between 24 and 25 in one year under consideration there was a marked rise and in the other year a corresponding fall in the sick-rate.

The incidence of certain groups of diseases classified by months and occupations was as follows: Undetermined febrile diseases were highest among sick-attendants, and in the month of August. Acute infective diseases were highest in February, lowest in August; highest among engineers, commissariat men, torpedo men, and musicians. Endemic chronic infective diseases were highest in April to September, and highest among sailors, torpedo men, and engineers. Diseases of the circulatory system and lymphatic system were highest in December, January, and February, and among torpedo men, sailors, and sick-attendants. Diseases of the respiratory system were highest in December and thence to March; sick-attendants, torpedo men, and sailors were mostly affected. Diseases of the digestive organs were highest in winter; sick-attendants showed the highest rate. Diseases of the genito-urinary system were highest in December, July, and March; musicians and commissariat men showed the highest rate. Diseases of the eye were highest in December; sailors, musicians, and engineers were the principal sufferers. Venereal diseases (other than syphilis) were highest in December, January, and April; musicians, sailors, and firemen showed

the highest rates. Syphilis was highest in July, and highest among sailors, musicians, and sick-attendants. Suicide and attempted suicide were highest in April to August; commissariat men, sick-attendants, and engineers were mostly affected.

RECRUITS.

Principal diseases and physical imperfections for which observation in hospital was ordered, or unfitness for service declared:—

Diseases	Average percentage of total levy for the two years
Constitutional debility	0·87
Deficient in height	0·74
Defective development of chest	1·68
Scrofula and tuberculosis	0·17
Hæmophylia, recurrent asthma, tuberculosis	0·11
Varix	0·12
Cretinism	0·01
Mental obtuseness	0·08
Mental aberration	0·13
Epilepsy	0·27
Chorea, neurosis	0·03
Chronic conjunctivitis	3·02
Hypermetropia, astigmatism, amblyopia	0·3
Actual myopia	0·63
Chronic otitis	0·23
Deficient or extensively carious teeth	0·85
Spinal curvature	0·26
Organic heart disease	0·37
Cardiac neurosis	0·14
Visceral hernia	1·97
Hydrocele	0·23
Varicocele	0·31
Multiple infirmities	0·44

H. E. R. J.

Correspondence.

THE ROYAL ARMY MEDICAL CORPS OFFICERS' BENEVOLENT SOCIETY.

TO THE EDITOR OF "THE JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

SIR,—At the General Annual Meeting of the Corps held at the College on June 15, an officer said he wished someone would write a short account of the various funds as officers never knew to what they were subscribing.

You kindly inserted for me a fairly full statement of the origin and objects of the Royal Army Medical Corps Fund in the Journal of May, 1911, and a shorter communication on the same subject in February, 1912, and perhaps a very brief account of the Royal Army Medical Corps Officers' Benevolent Society might be interesting to officers of the Corps who do not already subscribe if you would afford me a little space.

This Fund was founded by Sir James McGrigor in 1820, during his period of service as Director-General.

In the original circular approved by the meeting held in Berkeley Street, June 15, 1820, it was expressly stated that the Fund was "instituted with the view of affording relief to those *orphans* of Army medical officers who may be left under circumstances of particular distress; or who may be enabled by a small addition of income at a certain period of their lives to procure a better education than their limited means would otherwise allow; or who may require some assistance on their first establishment in life."

It was also decided that "the objects of its bounty will be selected from among those who produce the strongest claims upon its support. Where there is any equality of claim the preference will be shown to the orphans of those whose parents contributed to the Fund—orphans who have lost both father and mother will, if otherwise destitute, be considered to have a superior claim," and finally, "that relief by this Fund is always to be afforded in the form of periodical donations and never in that of annuity even for a limited number of years."

From these sound principles successive Committees have never departed for nearly one hundred years. Relief is distributed annually to the most deserving cases by the General Meeting according to the amount available from the interest of investments and annual subscriptions, and any surplus is invested. The first distribution was ordered at the General Annual Meeting held at Almack's Rooms on May 16, 1826, and was limited to £100. Our distribution list last year was over £730. The Fund has therefore grown and prospered, but it seems a matter for regret that by far the greater proportion comes from interest on investments and comparatively only a small amount from subscriptions and donations. In the earlier years of which I have examined the reports, the subscriptions, etc., were from £600 to £800 a year, whereas our last annual statement shows our income from these sources as less than £200.

Experience at committee meetings makes us acquainted with many sad cases of distress which could be more fully assisted if the Fund was better supported, and I cannot help thinking that if the facts were known we should have a larger number of subscribers. There must be over a thousand officers of the Corps on the Active and Retired Lists who read the Journal, but we have less than two hundred subscribers.

In the original circular quoted above it was somewhat quaintly "hoped that the opulent in the Department will remember this Fund in their testamentary dispositions." I do not know whether there are any "opulent" in the Corps at the present time, but I should think that many officers would prefer to pay the annual subscription of £1 1s., which gives them full membership of the Fund and enables them to see and take part in the benevolent work that is done, rather than make any "testamentary dispositions" for the distant future.

To recapitulate.

(1) The Fund is solely for the relief of orphans of officers.

(2) Grants are primarily intended to procure a better education or to assist young people to start in life.

(3) For this reason grants are not usually made to orphans above 21 years of age, but the Committee is authorized to recommend to the General Meeting special cases where from ill-health there is inability to earn a livelihood.

(4) Grants can only be made annually. Pensions are prohibited.

(5) Orphans whose parents subscribed to the Fund receive preference where there is an equality of claim.

(6) By the General Annual Meeting of 1913 Quartermasters of the Corps were admitted to the full benefits of the Society with other officers.

The Secretary is Lieutenant-Colonel F. W. Davie Harris, 124, Victoria Street, Westminster, and I am sure he will be glad to furnish a copy of the rules and any further information to all intending subscribers.

Belmont,
S. Farnboro',
June 30, 1914.

I am, etc.,
E. M. WILSON.
Lieut.-Colonel, R.P.

SOLDIERS' TEETH.

TO THE EDITOR OF "THE JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

SIR,—It was a great pleasure to read in the April number of the Journal Major Hooper's article on soldiers' teeth. His appreciation of the importance of this subject is endorsed by most of those who reflect on these matters. It does seem absurd for the State to spend large sums of money on the care—prophylactic and curative—of the soldier's intestines and leave the portal for infection almost unguarded. The harm done by oral sepsis is now recognized by all, and though something is being done in the Army to combat the evil the efforts are not, in in the opinion of many, either adequate or properly co-ordinated and directed.

As regards the suggestions made by the writer for dealing with the question, I should like to enter the strongest possible protest against them. These suggestions amount to the provision of half-trained medical officers and a horde of quarter-trained "dental attendants" to carry out the all-important duties of keeping the Army fit from a dental point of view. Major Hooper realizes partly the effects of this unqualified practice, but he has not realized the probable attitude of the General Medical Council and of the dental profession. Moreover it would never do to forego the high standard now rightly demanded in all other branches of military medical activity: the best, and nothing but the best, whether in sanitation, bacteriology, or dentistry. Dentistry is no longer merely a branch of medicine or surgery. By the standard demanded of its students and by its highly specialized technique it must frankly be recognized as a

separate, if allied, profession. To take the fullest advantage of modern dental science for the Army we must get the pick of the dental profession. To attract good men the advantages of the service must be as attractive for dentists as for doctors or veterinarians. The formation of technical corps out of the two latter professions has led to increased efficiency in the Army as a whole. If these premises are granted then the conclusion appears to be inevitable, namely, the formation of a technical corps from the dental profession. To some this may seem somewhat revolutionary, but to those of us who remember the conversion of the doctors and the veterinary surgeons into technical corps with army rank and titles the proposal to form a dental corps appears logical.

The details of such an army dental service cannot obviously be worked out here. Such a corps is, I believe, in existence in the United States Army. While on the staff of one of the divisions out here, I had the pleasure of working with an enthusiastic and capable civilian dentist attached to the division for military work. Between us we sounded the "powers that be" on the formation of such an army dental service, but nothing came of it; our proposals and suggestions may have been crude and impracticable, but I still consider that the line of thought is correct. Possibly some military medical officer at home may see his way to suggest a working plan for this service. For the Army the best, and nothing but the best!

I am, etc.,
W. H. Ogilvie,
Lieutenant-Colonel, I.M.S.

Delhi,
May 14, 1914.

A PAMPHLET ON FOREIGN STATIONS FOR THE USE OF OFFICERS.

TO THE EDITOR OF "THE JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

Sir,—It frequently happens that officers arrive at stations abroad with no knowledge of the conditions which exist in the stations, and it seems curious that we, as a corps, have not this information available in pamphlet form at head-quarters. I am quite aware of the difficulty of finding the money necessary for the printing, but the pamphlets should have a ready annual sale previous to the trooping season. There ought to be no difficulty in getting the necessary information if some officer, preferably married, at each station, would send to some central place a short account of the station. The temperature of the station, the housing accommodation, whether furniture can be hired or bought, details *re* motor-cars, horses, roads, shooting, might all be put down in a short space.

I am, etc.,
C. F. Wanhill,
Major, R.A.M.C.

Mhow,
Central India,
March 27, 1914.

VOLUME XXIII. AUGUST, 1914. No. 2.

Journal of the Royal Army Medical Corps.

ERRATUM.

In the article on "Heat-stroke," by Major Wanhill, the temperature of the white helmet No. 2 in the fourth series of figures, p. 663, should read 110° F., not 102° F.

In approaching the study of the epidemiology of rheumatic fever one turns naturally in the first place to the generally accepted notions of the factors which have to do with its incidence and spread, and if one takes the standard textbooks as a guide, one is struck by the extraordinarily little information which they give on the subject. This is only to be expected in a disease which causes comparatively little direct mortality and on which in consequence the official mortality figures throw little light as to its regional and seasonal distribution. A factor which militates against the value of the usual impressions given in the textbooks is that they have been formed mostly from experience in the hospitals of the larger towns and do not necessarily represent the condition of affairs among the general population whose sick are treated at home. Bearing these points in mind, one finds that the generally accepted views are that rheumatic fever is a disease which specially affects children and young adolescents, that there is a history of its occurrence in other members of the family in about twenty per cent of cases and that this is taken as evidence of the profound importance of hereditary predisposition. One finds also that the main exciting cause is given as exposure to cold and damp, especially if the subject is run down by previous illness, overfatigue, or inanition;

poverty is also recognized as an important factor in its causation. The frequent association of sore throats and scarlet fever with rheumatic fever is also one of the commonplaces of medicine.

With regard to the questions as to whether the disease is an infectious one, whether it show any signs of epidemicity, and what factors in climate, occupation, or surroundings affect its incidence, there is singularly little knowledge; for, though several workers have published papers on the subject, these have only appeared at long intervals and the field is naturally limited to those who, by reason of their peculiar or official position, have access to the necessary figures. The difficulties of the study have also been greatly increased by the vagaries of the official nomenclature; this is especially the case with army statistics, which should have by this time furnished figures of the greatest possible value had it not been that it is impossible to trace any sufficiently long succession of sickness and mortality returns; this is owing to the fact that at one time rheumatic fever is lumped with rheumatism, then separated from it for a while and lastly appears alone. This last change is due to the Royal College of Physicians of London having in their wisdom abolished the term "rheumatism" from the nomenclature, thus leaving the hapless medical officer without any label to put on those thousand aches and pains in joints which he was happy aforetime to call "rheumatism," and which in too many cases he now feels constrained to call "rheumatic fever" for want of any other name which to him seems appropriate. No doubt if he were very wise he would call them "inflammation of joints (non-suppurative)", but all his early training has led him to call these things rheumatism or some name like it and there is no definite guide given in the matter. I speak somewhat feelingly in the matter as a result of many heartbreaking experiences in attempting to trace the figures not only of rheumatic fever, but of other diseases in army statistics; time and again a promising line has come to an untimely end owing to a change in the nomenclature or classification.

Rheumatic fever was first separated officially in the Registrar-General's mortality returns in 1882, after that, according to Newsholme [1], it was found that the deaths from rheumatic fever formed 73·5 per cent of the combined deaths from rheumatic fever and rheumatism.

The separation seemed, however, to have been anticipated by some years in unofficial circles; Gabbett [2] in 1883 published an interesting and important study of the rheumatic fever cases

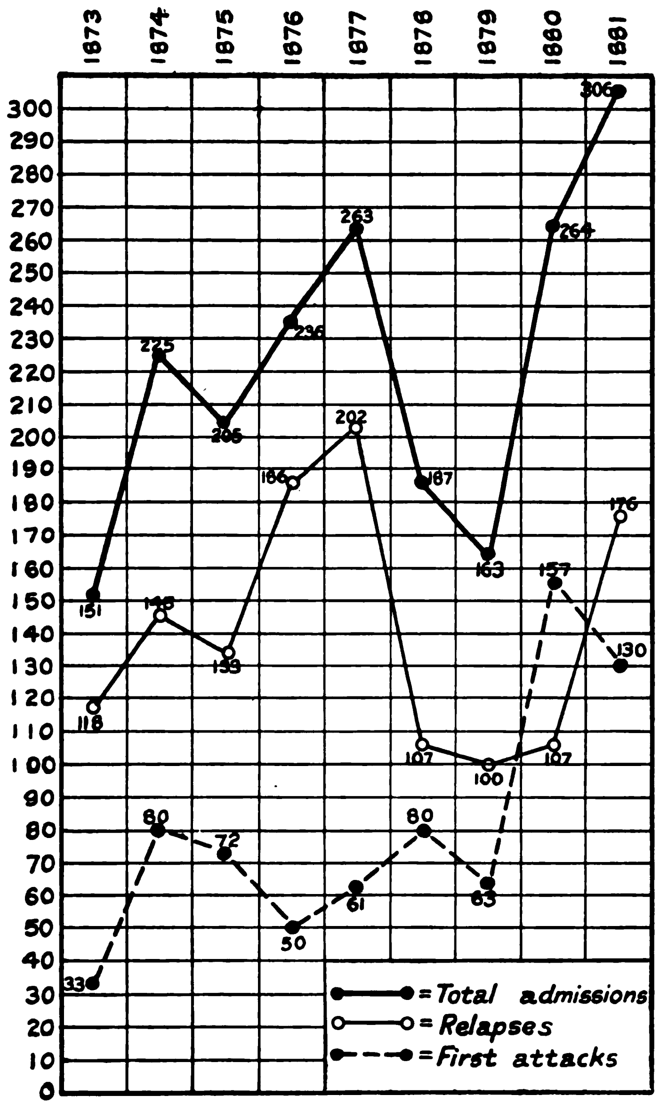


CHART I.—Yearly admissions for rheumatic fever to the London Hospital. Compiled from Gabbett.

admitted to the London Hospital in the years 1873-81, and he makes the valuable distinction between fresh cases and relapses. Charts I and II are compiled from his figures and give the main

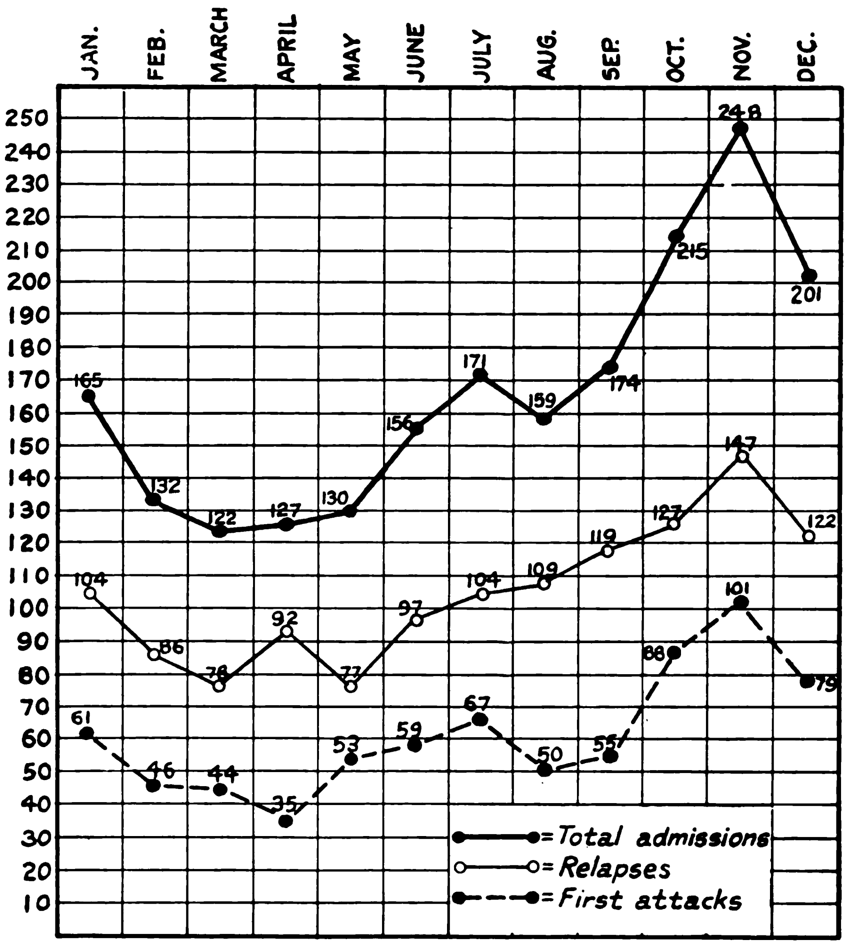


CHART II.—Total monthly admissions for rheumatic fever to the London Hospital during nine years. Compiled from Gabbett.

results of his researches, which went to show that there was a marked variation in the yearly incidence of the disease, the first attacks varying from 33 to 157 admissions a year, and the relapses from 100 to 202 per annum. His study of the monthly incidence

showed that the disease was least prevalent in the months of February to May, after that there was a gradual rise to September followed by a rapid increase in the number of admissions to a maximum in November, this was again succeeded by an equally rapid fall to February; the autumnal increase in the number of cases was much more marked in the case of first attacks than in the relapses, which showed a very steady increase from May to November. This seasonal distribution, however, does not seem to prevail in all countries, for Gabbett quotes Besnier [3] who, out of an analysis of 8,631 cases, found that in France the disease is very evenly distributed throughout the four quarters of the year; while Davidson [4] reports that in Norway the disease is most prevalent in the first three months of the year and least common in August, September, and October. Gabbett also found that rheumatic fever was more prevalent in hot dry seasons than under opposite conditions.

Newsholme [1], from an analysis of the mortality returns, found that rheumatic fever showed great irregularities in its incidence from year to year, and that epidemics tended to recur at intervals of three to four years; seasons of epidemic prevalence tended to extend over periods of one to three years, and in other cases of six to eight years, the latter type being chiefly found in large centres while the shorter periods were more characteristic of the country in general. The principal years for rheumatic fever in England were 1855-56, 1859, 1864-65, 1868-71, 1874-76, 1884-85, 1888, and 1893. It is interesting to compare these years with Gabbett's figures, which show that the epidemic of 1874-76 reached its maximum in London a year later, when apparently it was dying down in the country as a whole, while there appears to have been an outbreak in London in 1880-81, which does not seem to have affected the general mortality for rheumatic fever in the country; one may probably assume that this was an example of a local epidemic.

As showing the variations in the amount of the disease in different parts of the country Newsholme found that in the hospitals of:—

Aberdeen,	admissions	for rheumatic	fever =	7·4	per cent	of the total	admissions.
Glasgow,	,,	,,	,,	4·35	,,	,,	,,
London,	,,	,,	,,	8·43	,,	,,	,,
Birmingham,	,,	,,	,,	9·71	,,	,,	,,
Manchester,	,,	,,	,,	5·69	,,	,,	,,

The death returns showed that rheumatic fever was most fatal in counties like Lancashire and the West Riding of Yorkshire with

a large urban population; in this respect agreeing with Scandinavia, where the disease is notifiable, and where it is found that the sickness-rate is higher in towns than in the country.

There was a definite association to be traced between the incidence of rheumatic fever and high mean temperatures; in London, for example, he found that epidemics only occurred when the mean temperature of the soil at four feet deep was above 50° F. and that as a rule a low rainfall meant a high rheumatic fever incidence. He quoted cases which suggested infectivity of the disease, and he compared its epidemicity with that of malaria as an epidemic but not directly infectious disease.

Newsholme's findings as to the frequency of rheumatic fever in large towns were supported by the findings of the collective investigation [5] into this and allied diseases which was undertaken by the British Medical Association in 1889; from this it appeared that chorea was particularly prevalent in large towns and relatively infrequent in seaside health resorts. With regard to the seasonal incidence of the disease Branson [6], like Gabbett, found that the autumn was the chief period of its occurrence in England; his figures show a rise above the mean starting in August, reaching a maximum in October, and returning to the mean in December and January. The rise in the rate for chorea does not start till November and reaches its maximum in January; this seems to point to the idea that chorea is a late manifestation of the rheumatic infection, if infection it be, as seems not unlikely.

Sandison [7], from an analysis of 1,053 cases admitted to Guy's Hospital during ten years, found that the maximum incidence was in the latter half of the year, and he found a close parallel between the monthly incidence of rheumatic fever and of scarlet fever. In the matter of weather conditions Sandison found that there was a close relationship between the total number of hours of bright sunshine and the number of cases of the disease; his general conclusion was that cases are most frequent in the presence of bright sunshine, a high temperature, and easterly winds; when once the disease had become established humidity tended to keep it up. It might be suggested that this may be due to the fact that damp, although it does not apparently favour the onset of first attacks, does, as common experience shows, tend to produce relapses in those who have had one attack of the disease; just as in malaria chill so frequently determined an attack of ague in an infected subject.

This study of the influence of weather conditions in England

leads one to inquire how far it is borne out by the experience of other countries. So far as army statistics are concerned the figures for 1904-07 are available for this purpose, and are given in the following table:—

ADMISSIONS FOR RHEUMATIC FEVER PER THOUSAND STRENGTH.

Year	United Kingdom	Egypt	S. Africa	India
1904	0·8	1·2	3·2	0·5
1905	1·1	1·6	2·3	0·4
1906	1	0·6	2·8	0·3
1907	0·9	2·1	1	0·9

It is noted with regard to the South African figures that the disease is specially prevalent in the Transvaal and the Orange Free State. So far as they go these figures lend little support to the idea that cold and wet are important factors in the production of the disease, since, for example, it will be seen that there is about as much rheumatic fever in the warm and dry climate of Egypt as in the United Kingdom, while the comparatively warm, dry and bracing climate of the high veldt produces even more of the disease than our wet and most times chilly climate. On the other hand the Indian figures show that heat by itself is not a determining factor. Davidson [4] in his geography of disease gives reports which support the same conclusions as to the relative frequency of rheumatic fever in Egypt and South Africa and its comparative rarity in India, where, in Bombay in 1888, the deaths from rheumatic fever formed 1·37 per 1,000 of the total deaths as against 5·2 per 1,000 of the total deaths in the United Kingdom. From the same author one gathers that the deaths from rheumatic fever and rheumatism of the heart in New South Wales, South Australia, and New Zealand in 1886-89 were little more than a third of those in the United Kingdom for the same years; while in Queensland, which has a tropical or sub-tropical climate, the incidence of rheumatic fever is distinctly higher than in the more temperate parts of the country, though the death-rate due to it is still lower than in the United Kingdom, being, in 1887-88, 53·8 per million as against 95 per million for the same disease in the United Kingdom in the same years. Davidson also makes the interesting statement that rheumatic fever is almost unknown in China while it is rare in Japan; this may be a racial matter, but it is interesting that in these countries as well as in India, where the disease is comparatively rare, it is the universal custom to boil milk before use. The author's inquiries provide also some interesting contrasts; for example, it is stated that in the Cape Verde

Islands, which lie 16° from the equator, rheumatic fever is so common that it is rare to get a necropsy in which the heart does not show some signs of its action; on the other hand, in the Falkland Islands, 52° from the equator, the disease is rare, and in the Falkland Islands Blue Book for 1889 the Colonial surgeon states that he had not seen a case for two years although the people are constantly getting wet and rarely change their clothes. It is stated also that rheumatic diseases are extremely common in Monte Video, where they cause 6 per 1,000 of the total deaths as compared with an average for the United Kingdom of 4·8; they are said to be equally common on the Parana, Uruguay, and Paraguay rivers; all these parts enjoy a tropical or sub-tropical climate; on the other hand, in Norway the death-rate for rheumatic fever is slightly lower than in England. In all these facts one finds little support for the idea that chill and wet are prime factors in the causation of the disease; at the same time they leave one just about as much in the dark as ever as to the real factors in the case, except that it seems to be established that a high summer temperature and dry weather are usually followed in this country by an excessive incidence of rheumatic fever, and that in countries where milk is habitually boiled before use the disease is either rare or at least much less common than in this country.

On the Incidence of Valvular Disease in the United Kingdom.

It must have struck most of those who have studied the incidence of rheumatic fever that if one could only get at the distribution of acquired heart disease in the young, one would probably arrive very near the distribution of rheumatic fever. There is little need to labour the point that rheumatic fever is very common in young people and that it causes most of the acquired heart disease which is found among them; thus Langmead [8] found from an examination of 2,556 London school children that 5·2 per cent of them were definitely rheumatic, and of these—133 children in all—115 showed some evidence of cardiac disorder, while 2·93 per cent of the total had definite valvular disease, it being distinctly more common among the older children. Branson [6] got similar results. He found thirteen examples of acquired heart disease in an examination of 500 girls in a London County Council school, and he states that 86 per cent of the heart disease of school children is acquired. The statistics of

the medical officer to the Board of Education [9] for 1912 show a much lower incidence over the whole country. From an examination of 130,419 female children and 136,074 males it was found that there was a percentage of 1·09 girls and of 0·82 boys suffering from valvular disease. These figures, as will be seen later, correspond very closely with the incidence of valvular disease in recruits. It is stated that the underlying cause appears to be undoubtedly rheumatic fever, though a certain proportion of the cases can be traced to scarlet fever and diphtheria.

It seemed, then, that if one knew the distribution of acquired heart disease throughout the country one would get pretty near the distribution of rheumatic fever, and for this purpose the records of recruits offered a promising field, since they are all young adolescents of approximately the same age; too young to show senile changes or to have among them more than a very small proportion of syphilitic heart disease. At the same time they are, in all but a very few cases, healthy looking young men, and the usual causes of hæmic murmurs such as pronounced anæmia and exhausting disease are for the most part excluded. The examinations are made by men who are constantly changing, so that the returns of the man who has a "bee in his stethoscope" are drowned by the figures of the large majority of normal doctors of average ability, and if one takes a sufficient number of years, one gets a very reliable index of the average opinion; the only stations where this does not apply are the small ones which are manned by civil practitioners, and in these cases the number of recruits is not sufficient as a rule to vitiate the results of a district. This must not be taken to imply any reflection on the ability of the civilian practitioners referred to, but simply as showing that in these small stations the added value to the statistics which comes from their representing the work of a number of men who are constantly changing does not apply. There remains, however, to be discussed how far a diagnosis of valvular disease made in the recruiting-room is to be relied on. It has been suggested that in the rush of recruiting the examination of the heart ends in the finding or not of a murmur, and that a murmur is no sure index that valvular disease is present. This may be admitted very readily, but one must remember that a large number of the usual causes of functional murmurs are excluded by the fact that one is dealing with apparently healthy young men and not with anæmic girls or hospital patients; and, so far from there being a rush in the recruiting-room, the very monotony of the work provides a safeguard,

since the finding of an abnormality arouses at once all the examiner's medical instincts. Here at last in the midst of this deadly routine is something of interest, and the average man who finds a murmur carries the examination further in order to satisfy himself as to its nature. For the rest one must rely on one's personal experience for a guide as to the proportion of functional to organic murmurs which is found among recruits. On my own part I have found that in the great majority of cases a murmur in a recruit is of organic origin, especially if one excludes the easily detected cardio-respiratory murmur which is found when a recruit, full of amateur military notions, keeps his chest hyperdistended during the whole course of the examination. I have asked many of my brother officers for their opinion in this matter, and find that most of them agree that the majority of murmurs found in recruits are organic in origin and are usually accompanied by some other signs of embarrassment of the heart, especially by hypertrophy; indeed, in many cases, the thump of the hypertrophied ventricle felt during the process of measuring the chest suggests that the heart is affected. That there is no great excess of rejections for heart disease is shown by the increase in the incidence and invaliding from this cause during war-time; for example, during the South African War the invalids for valvular disease amounted to 4·27 per 1,000 strength of the troops on service as against an average of 1·23 per 1,000 for the years 1902-11. This represents the effect of the strain of active service in bringing out symptoms in cases in which they might never have appeared but for excessive strain. It is also common experience to find valvular disease among soldiers during examination for fitness to undertake gymnastics, to undergo imprisonment, or enter on active service; thus during the years 1900-02 the invaliding rate for troops not on active service was nearly twice as much as the average for the ten following years, and a great part of this excess was probably due to the number of cases of men who were found to have heart disease when they came up for examination as to their fitness for active service. The close correspondence of the ratio of rejections of recruits for valvular disease with the number of boys found to be suffering from this disease in the London County Council schools affords additional support to the idea that the rejection-rate is a true one.

It seemed then probable that a return of the number of recruits rejected for valvular disease, station by station, over a number of years would provide a very fair index as to the amount of rheumatic fever in the different parts of the country; and with this in view

I obtained, through the kindness of the Director-General of the Army Medical Service, returns of the recruits rejected at each station during the last ten years for (1) valvular disease, (2) disordered action of the heart, and (3) other heart diseases. The returns are not complete in all cases, since in some stations the returns for the earlier years had been destroyed, but this fact only lessened the total number of cases dealt with, and in the great majority of stations complete figures were available. The returns gave the results of 608,485 examinations, and the general outcome was that the rejections for valvular disease in the whole kingdom amounted to 9 per 1,000 of the men examined, while the rejections for disordered action of the heart, which includes such things as palpitation and undue frequency of the pulse, were 14·8 per 1,000 of the recruits examined. In this paper it is proposed to deal only with valvular disease, and with regard to "disordered action of the heart" I will content myself with saying that the returns for this disability show no parallelism whatever with those for organic disease, and that it is obvious that the two conditions own a perfectly different causation.

The figures were examined with a view to finding: (1) the general distribution of valvular disease throughout the country; (2) whether there was any evidence of epidemicity or excessive endemicity in any particular parts; and (3) whether there was any factor in social or hygienic conditions which favoured the spread of the disease. Incidentally one or two interesting facts emerged, which will be referred to in due course.

The general results throughout the whole country are given in Table I. It will be noticed that there is a sudden rise in the number of rejections for valvular disease in 1906. This is probably due to the fact that about that time special attention was being drawn to the heart, and that at the beginning of that year there was an order published that the pulse-rate of all recruits was to be entered on their medical history sheets by the examining medical officer. The rejections for disordered action of the heart show a very much greater rise at the same time. It is probable that a portion at least of this increase was not justified, since it was not followed by a diminution of the number of recruits under three months' service who were rejected for these causes; there is, indeed, a diminution of these rejections, but it does not commence till 1908, the year in which the new system of physical training came into use. At the same time it is curious that the rise referred to only affected England (Table II), and not, as will be seen by

reference to Tables III, IV, and V, Scotland, Ireland, or Wales, so that it is still possible that it was a genuine rise. When one comes to deal with the different portions of the country one finds considerable variations in the year to year incidence. This is specially marked in the case of Scotland, where the rejections varied from 3·49 to 16·3 per 1,000. It is also to be noted that the rejection-rate for Scotland over the whole ten years is definitely below that of England or Ireland, being 8·03 as compared with 9 and 9·1 for the latter countries; this seems again a point against the idea that cold and wet are the main factors in the production of rheumatic fever and its sequelæ. In order to get some idea of the distribution of valvular disease in the country I have arranged the returns of the different countries in county groups in order of the frequency of the disability in each group. It was not possible to adhere strictly to the geographical boundaries of counties on account of the distribution of the recruiting areas, and it will be noticed that I have grouped counties together wherever it was impossible to separate the figures from each individually (Tables VI, VII, and VIII). Taking the English and Welsh counties first, it will be seen that there is a very great variation in the rejection-rate in different districts from the very low rate of 1 per 1,000 in the Channel Islands to 32·4 in the East Riding of Yorkshire, a figure which is due to the enormous number of rejections for valvular disease in Hull. This return is, however, open to doubt, since in this station there is shown a low rejection-rate for disordered action of the heart, and it is possible that the figures for the two diseases have been reversed; the return from this station, however, gives such an exceptionally high rejection-rate that the matter would seem worthy of special investigation. Stockport and Hyde also show an extremely high figure, the ratio for the former being 46·8 per 1,000, and for the latter 65·6. These are two neighbouring stations close to Manchester, and the fact that two different men find so much valvular disease among their recruits seems to point to a genuine case of high endemicity; the matter could only be settled by a local investigation. The West Riding of Yorkshire and the industrial districts of Lancashire provide instances of areas where the incidence of valvular disease is exceptionally high; in these cases the statistics are made up from the returns of a large number of stations manned for the most part by men who are continually being changed. The case of the West Riding provides some curious contrasts. Here York shows a rejection-rate of 27 per 1,000, Sheffield 17·9, and Leeds 13·2, while in Bradford, which is quite close to Leeds,

the ratio is only 3·96; what local conditions produce this curious contrast I am unable to surmise. A broad fact seems to come out of a general survey of the incidence of the disease in the different districts, and that is that there is a special tendency to the occurrence of valvular disease in towns and especially in industrial towns. If one groups the areas according to the Registrar-General's divisions into urban registration counties and rural registration counties the difference between town and country comes out very clearly. In the urban counties the rejection-rate of recruits for valvular disease amounts to 14·9 per 1,000, while in the rural counties the ratio of rejections is only 7·1 per 1,000. At the same time it is obvious that it is not altogether a matter of town life, since most of the principal cities, such as London, Manchester, Liverpool, Birmingham, Dublin, and Edinburgh, show a rejection-rate at or very much below the average, and in those large cities where the incidence is above the average the industrial factor is usually well marked. The influence of industrialism is very well shown in the Stafford-Warwick group. Here the Potteries, which have only been separated recently, and which formerly were a part of the North Stafford area, show the highest incidence. Then comes the North Stafford area, which includes a good many of the figures for the Potteries; then South Staffordshire, followed *longo intervallo* by Warwickshire, excluding Birmingham, and lastly the almost purely agricultural Worcestershire. Birmingham shows a high incidence for a city of its size, but even here the incidence is much below that of the industrial cities of North Staffordshire. It almost looks as if there was some factor in industrialism which specially favoured the incidence of valvular disease and which was modified by the conditions pertaining to large cities. In certain cases where the incidence is high this factor cannot be traced, as, for example, in Sussex and the town of Brighton, but these stand out as exceptions to what appears to be the general rule. Another feature which seems to emerge is the relative immunity of coal mining districts, which in most instances show a rejection-rate below the average.

The returns for Ireland show the same tendency to an especial prevalence of valvular disease among the recruits in the medium sized towns and to a relative immunity of large cities. The returns for Belfast city would seem at first sight not to support this idea; but when one examines them in detail one finds that almost all the rejections occurred in the years 1901-02, for which years the ratio of rejections for valvular disease was 40·9 per 1,000, while the ratio

of rejections for this disease during the next eight years only amounted to 1·3 per 1,000; it may be that the figures for the first two years are correct, but it is remarkable that the rate fell in 1903 from 39 to 0·57, while in the succeeding seven years it only twice reached 3·3 per 1,000: one is tempted to suspect that it was a case of the bee in the stethoscope. Industrialism will not explain the high incidence in the smaller cities in Ireland, and it is difficult to suggest a satisfactory explanation for its occurrence. In the Scottish returns, again, one finds that the areas which have the largest incidence are those which contain the towns. Edinburgh conforms to the rule for large cities and has an incidence well below the average; on the other hand, Glasgow shows a relatively high rate—it may be that this is due to the markedly industrial character of the city. Perth shows a very high rejection-rate, while Dundee has a particularly low one. I am not sufficiently acquainted with the local conditions in these places to be in a position to suggest an explanation for the difference between them.

Taking the figures as a whole one can say that there are great differences in the amounts of valvular disease found among the recruits in different parts of the country; that it is specially common in towns of an industrial character and less so in large cities, while it is relatively infrequent in country districts. The places where it is most common are the manufacturing districts of Lancashire and Yorkshire, Leicester, North Staffordshire, Kent, and Sussex, while towns like Stockport and Hyde and York stand out in special prominence.

With regard to the question of epidemicity, if the valvular disease which is found among recruits is mainly due to rheumatic fever, and if, as Newsholme states, epidemic periods of rheumatic fever extend over three or four years, one would expect to find traces of epidemics among the recruits in the years following an epidemic period. One finds as a matter of fact that there are great variations in the year to year incidence of different stations; this will be seen by reference to Table IX, in which the yearly returns of a number of the large stations are given as examples.

The stations in the table were chosen on account of their having a large number of recruits in each year, thus giving the ratios a significance which they would not have in the case of stations returning smaller numbers, but almost every other one of the districts shows similar variations.

On the Relations of Rheumatic Fever to other Diseases.

It struck me that it would be interesting to find out what, if any, connexion there was between the amount of rheumatic fever in a community and its general state of health; for this purpose I worked out the statistics of the principal towns and found that there was no connexion between the amount of valvular disease among the recruits and the general death-rate of those places. For example, the recruits of Manchester and Liverpool are comparatively free from heart disease, but the death-rate of those towns is much higher than, say, Bristol, which has about twice as much valvular disease among its recruits as Manchester

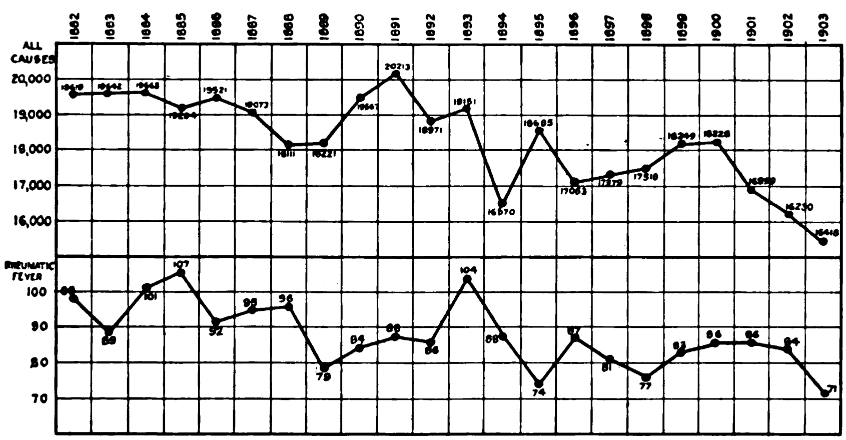


Chart III.—Annual death-rate from all causes per million living; compared with the death-rate from rheumatic fever and rheumatism of the heart.

and Liverpool. One can also get some information on this point from a study of the Registrar-General's returns of the death-rate from all causes, and from rheumatic fever and rheumatism of the heart. I have placed the figures for these on Chart III. From this it will be seen that although there has been a decline in both the general death-rate and the one for rheumatic fever, the reduction in the latter case, comparing the first with the last five-year period, has only amounted to 16·2 per cent as against 28 per cent in the death-rate from all causes. It will also be seen that the rise and fall in the death-rate for rheumatic fever is not parallel with that of the general death-rate; and, if one remembers that there has been a reduction in the case mortality of rheumatic fever owing to

a steadily increasing appreciation of the benefits of salicylates, the thought suggests itself that rheumatic fever has shared less than most diseases in the general improvement in the health of the population, and that although the better sanitary condition of the country has resulted in some diminution in the amount of rheumatic fever there is probably some special factor in its spread which is at present largely untouched. In the hope of getting some information as to the type of conditions which favour the incidence of rheumatic fever I made a comparison between the incidence of valvular disease among recruits in different districts and the death-rates for phthisis, scarlet fever, and diarrhœa in the same districts. I chose these for the following reasons: phthisis because it is a type of disease which is definitely encouraged by poverty and overcrowding; scarlet fever because one so frequently finds suggestions that this disease and rheumatic fever are often associated and behave in a similar fashion as regards epidemicity; diarrhœa because it gives a very fair index of the amount of artificial feeding which goes on in a district, and, as was remarked at the beginning of this paper, because there seemed to be some evidence that rheumatic fever was rare in countries where raw cow's milk was not drunk. It would serve little purpose to give the detailed figures which I got on this point, suffice it to say that I found no parallelism between the death-rates for these diseases and the amount of rheumatic valvular disease found among the recruits in a community. A similar result has followed my examination of the possible connexion between valvular disease and poverty and overcrowding. For this purpose I compared my figures with the ratio of paupers per 1,000 of the population and with those of the density of the population; in neither case was any connexion to be traced; this is a result which might have been anticipated, since the comparatively well-to-do and well-housed population of the industrial districts of Lancashire and Yorkshire is just the one which provides the largest amount of valvular disease, while Dublin, where the population is both poor and overcrowded, has a comparatively low incidence.

On the Prognosis of Acquired Valvular Disease.

The fact that a young patient has developed valvular disease as a sequel of rheumatic fever is always one which gives rise to grave misgivings as to his future, and I fancy that most medical men, if they were asked to give off-hand an estimate of his chances of complete recovery, would be inclined to rate them low; yet it

must have struck many men, as it struck me when I was engaged in general practice, that if the majority of cases of acquired valvular disease eventually die of their disease, one should have about as many if not more cases of failing heart on one's list as one has of cases of rheumatic fever with newly acquired heart disease, since under the conditions named the outflow should about equal the inflow, and any small number of recoveries, or deaths from intercurrent disease, would be more than compensated for by the longer duration of cases of failing compensation as compared with acute rheumatic cases. I think it is common experience that this is not the case, and that one has a far greater number of cases of rheumatic fever every year than one has of fatal heart disease of rheumatic origin. That was, at any rate, my experience in the West Riding of Yorkshire and in Derbyshire, and my friends in Lancashire tell me the same tale. In the earlier part of this paper I quoted the statistics of Langmead, who found valvular disease in 29 per 1,000 of London school children, a figure which approximates closely to that of Branson who found the disability present among London school girls to the extent of 26 per 1,000; both these figures are much higher than that given by the medical officer for the Board of Education as pertaining to the whole country, namely, about 10 per 1,000. If the former figures are correct for London it is obvious that a good deal of the valvular disease disappears between school age and the time the recruit comes up for enlistment at about the age of 19, when, as will be seen by reference to Table VI, the amount of valvular disease found amounts to 7·6 per 1,000 of those examined.

It has already been shown that in England and Wales the number of recruits found to have valvular disease amounts to as nearly as possible 9 per 1,000; if one takes this as representing the heart condition of the young male population—and I think it is a fair assumption—one finds that 9 per 1,000 of the male population have acquired heart disease before the age of 19. It is interesting to inquire as to the fate of these people, and if one turns to the statistics of the Registrar-General, one finds that the deaths from valvular disease and hypertrophy and dilatation of the heart amount to 0·413 per 1,000 males living. If one makes an allowance of one-third for the heart disease contracted in later life from syphilis, arteriosclerosis, and other such causes one gets a death-rate from the heart disease consequent on rheumatic fever of 0·275 per 1,000. In other words the inflow is 9 per 1,000 and the outflow only 0·275 per 1,000, making the risk of dying of a heart disease contracted before the age of 19 something like 30 to 1 against. The figures

are of course only approximate, but the differences between the attack-rate and the death-rate are sufficiently great to show that the prognosis of the acquired heart disease of youth is not nearly so bad as is so commonly believed, provided the patient is exposed only to the ordinary strains of everyday life. In an earlier part of the paper I have given statistics showing that the stress of war was so effective in bringing out symptoms in latent heart disease that the invaliding rate during war time almost quadrupled itself.

CONCLUSIONS.

(1) Rheumatic fever is a disease which is specially prevalent in towns, less so in first class cities, and still less in country districts.

(2) Its distribution throughout the country shows areas of special endemicity in which further investigation would probably prove useful.

(3) There is evidence that rheumatic fever tends to occur in epidemic form, being favoured by drought and high temperatures.

(4) I have been unable to find any evidence that cold and wet are important factors in its causation, though they probably help to determine relapses.

(5) I have found no evidence that the endemic distribution of rheumatic fever is increased by poverty and overcrowding.

(6) The prognosis of valvular disease contracted in youth appears to be much more favourable than is usually supposed.

(7) There is a mass of latent valvular disease in the community which becomes manifest under conditions of exceptional strain, such as that of war.

TABLE I.—REJECTIONS OF RECRUITS FOR VALVULAR DISEASE IN THE UNITED KINGDOM.

Year	Examined	Rejected	Ratio per thousand
1901	59,756	385	7·6
1902	65,658	534	8·1
1903	57,770	435	7·5
1904	60,627	485	8
1905	60,316	442	7·3
1906	57,855	602	10·4
1907	57,611	539	9·35
1908	76,420	736	9·6
1909	64,421	675	10·5
1910	57,051	621	10·9
Total	608,485	5,454	9

Period	Examined	Rejected	Ratio per thousand
1901-05	295,127	2,281	7·7
1906-10	313,358	3,173	10·1

NOTE.—The pulse-rate of recruits was ordered to be recorded on the medical history sheet in 1906.

TABLE II.—Rejections of Recruits for Valvular Disease in England.

Year		Examined		Rejected		Ratio per thousand
1901	..	40,640	..	230	..	5·66
1902	..	48,135	..	354	..	7·36
1903	..	42,318	..	318	..	7·5
1904	..	43,881	..	352	..	8·02
1905	..	43,150	..	307	..	7·1
1906	..	43,325	..	437	..	10·38
1907	..	42,021	..	409	..	9·74
1908	..	57,433	..	593	..	10·3
1909	..	49,435	..	585	..	11·8
1910	..	44,096	..	528	..	12·0
	Total	453,434	..	4,113	..	9·07

TABLE III.—Rejections of Recruits for Valvular Disease in Scotland

Year		Examined		Rejected		Ratio per thousand
1901	..	4,499	..	24	..	5·33
1902	..	5,271	..	29	..	5·5
1903	..	3,889	..	38	..	9·77
1904	..	4,184	..	48	..	11·47
1905	..	4,270	..	31	..	7·26
1906	..	4,108	..	67	..	16·3
1907	..	4,863	..	39	..	8·02
1908	..	6,169	..	58	..	9·4
1909	..	5,094	..	26	..	5·1
1910	..	4,298	..	15	..	3·49
	Total	46,645	..	375	..	8·03

TABLE IV.—Rejections of Recruits for Valvular Disease in Ireland.

Year		Examined		Rejected		Ratio per thousand
*1901	..	5,077	..	130	..	25·7
*1902	..	9,944	..	136	..	13·7
1903	..	9,533	..	66	..	6·9
1904	..	10,114	..	69	..	6·8
1905	..	10,335	..	79	..	7·65
1906	..	9,774	..	82	..	8·4
1907	..	9,724	..	82	..	8·42
1908	..	11,555	..	74	..	6·4
1909	..	8,934	..	57	..	6·4
1910	..	7,615	..	68	..	8·95
	Total	92,605	..	843	..	9·1

* High owing to Belfast city returns (single man ?).

TABLE V.—Rejections of Recruits for Valvular Disease in Wales.

Year		Examined		Rejected		Ratio per thousand
1901	..	540	..	1	..	1·85
1902	..	2,308	..	15	..	6·5
1903	..	2,030	..	13	..	6·4
1904	..	2,448	..	16	..	6·5
1905	..	2,561	..	25	..	9·77
1906	..	1,648	..	16	..	9·7
1907	..	1,003	..	9	..	8·75
1908	..	1,263	..	11	..	8·7
1909	..	958	..	7	..	7·3
1910	..	1,042	..	10	..	9·6
	Total	15,801	..	123	..	7·8

TABLE VI.—ENGLISH AND WELSH COUNTIES ARRANGED IN THE ORDER OF FREQUENCY OF REJECTIONS OF RECRUITS FOR VALVULAR DISEASE DURING THE YEARS 1901-10.

Counties	Examined	Rejected	Ratio per thousand
Channel Islands	999	1	1
Wiltshire	4,812	11	2·29
Oxford and Bucks	6,300	16	2·54
Brecon, Cardigan, Caermarthen	2,127	6	2·8
Pembroke, Radnor, Montgomery, Hereford, and Shropshire	1,865	6	3·2
Durham and Northumberland	16,493	58	3·5
Northamptonshire	4,999	19	3·8
Westmorland and Cumberland	2,479	13	5·25
Monmouth	2,656	16	6
Middlesex	10,578	65	6·1
Hampshire	20,989	138	6·57
Aldershot Command	*5,977*	*21*	*3·5*
Lancashire	57,676	403	7
Manchester	*22,024*	*83*	*3·7*
Liverpool	*10,170*	*74*	*6·9*
Blackburn	*2,266*	*23*	*10·1*
Bury	*1,488*	*17*	*11·4*
Burnley	*4,117*	*83*	*16·6*
Warrington	*4,659*	*44*	*9·45*
Preston	*4,476*	*37*	*8·25*
Dorset	4,595	33	7·2
Lincolnshire	1,952	14	7·2
Norfolk	3,764	27	7·35
Great Yarmouth	*1,837*	*6*	*3·27*
Rest of county	1,837	21	11·4
Notts and Derby	14,942	111	7·4
City of Nottingham	*6,487*	*57*	*8·8*
Rest of the counties	*8,455*	*54*	*6·4*
London	88,130	649	7·6
Bedford, Herts, and Hunts	5,010	39	7·8
Cornwall	1,266	10	7·9
Devon	6,196	50	8·1
Yorks (N. Riding)	7,482	64	8·56
Middlesbrough (no D. A. H. shown)	*2,598*	*58*	*22·35*
Rest of Riding	*4,884*	*6*	*1·23*
Essex	6,366	56	8·8
Worcester, Staffs, and Warwick	58,688	528	9
Potteries	*943*	*28*	*29·7*
N. Stafford	*9,225*	*112*	*12·15*
S. Stafford	*8,365*	*73*	*8·73*
Birmingham	*30,973*	*282*	*9·12*
Worcestershire	*4,922*	*11*	*2·23*
Warwickshire	*4,260*	*22*	*5·17*
Suffolk	7,930	72	9·07
Glamorgan	9,043	86	9·5
Cardiff	*5,567*	*47*	*8·45*
N. Wales	1,765	18	10·2
Berkshire	5,047	55	10·2
Somerset and Gloucester	16,361	163	10
Bristol	*4,900*	*51*	*10·4*
Kent	12,192	145	11·9
Chatham area	*1,901*	*36*	*18·9*
Dover	*1,310*	*17*	*12·9*
Yorks (W. Riding)	50,034	612	12·24
York	*1,818*	*49*	*27*
Sheffield	*10,737*	*191*	*17·9*
Halifax	*7,459*	*94*	*12·6*
Leeds	*14,145*	*183*	*13·2*
Bradford	*9,095*	*36*	*3·96*

TABLE VI.—*continued.*

Counties	Examined	Rejected	Ratio per thousand
Pontefract	*6,780*	*59*	*8·7*
Sussex	7,847	110	14
Brighton	*1,649*	*23*	*13·95*
Leicester and Rutland	10,673	160	15·1
Cheshire	7,346	138	18·8
Stockport and Hyde	*1,925*	*109*	*56·6*
Birkenhead	*2,067*	*14*	*6·77*
Rest of county	*5,421*	*29*	*5·35*
Surrey	6,958	151	21·7
Yorks (E. Riding)	5,306	172	32·4
Hull	*3,730*	*169*	*45·3*
Rest of Riding	*1,576*	*3*	*1·9*

TABLE VII.—Irish Counties arranged in the Order of Frequency of Rejections of Recruits for Valvular Disease.

Counties	Examined	Rejected	Ratio per thousand
Roscommon, Leitrim, Sligo, and Galway	5,360	25	4·66
Donegal, Tyrone, Fermanagh, and Londonderry	5,642	36	6·4
City of Londonderry	*2,665*	*14*	*5·25*
Louth, Meath, Westmeath, Longford, King's, Queen's, and Kildare	7,067	46	6·54
Dublin City	23,324	164	7·03
Kilkenny, Wexford, Tipperary, Waterford, Wicklow, and Carlow	10,387	100	9·62
Waterford City	*2,914*	*46*	*15·8*
Remainder of counties	*7,473*	*54*	*7·2*
Armagh, Down, Antrim, Monaghan, and Cavan	25,585	286	11·12
**Belfast City*	*16,850*	*213*	*12·62*
Remainder of counties	*8,735*	*73*	*8·36*
Cork, Limerick, Clare, and Kerry	14,959	190	12·7
Cork City	*6,081*	*98*	*16·1*
Limerick City	*3,380*	*59*	*17·5*
Remainder of counties	*5,498*	*33*	*6*

* The figures for both valvular disease and disordered action of the heart are very irregular in this station.

TABLE VIII.—Scottish Counties arranged in the Order of Frequency of Rejections of Recruits for Valvular Disease.

Counties	Examined	Rejected	Ratio per thousand
Berwick-on-Tweed	1,874	4	2·14
Aberdeen, Banff, and Kincardine	1,313	5	3·8
Inverness, Moray, Nairn, Elgin, Sutherland, Caithness, Ross, and Cromarty	1,904	8	4·2
Ayr and Wigtown	3,057	20	6·54
Edinburgh, Linlithgow, Haddington, and Peebles	4,553	30	6·6
Edinburgh and Leith (4 years)	*4,253*	*27*	*6·35*
Perth, Forfar, Fife, and Kinross	10,468	78	7·45
Perth City	*2,984*	*59*	*19·8*
Dundee City	*4,546*	*5*	*1·1*
Remainder of counties	*2,938*	*14*	*4·76*
Lanarkshire	23,436	220	9·4
Glasgow City	*18,007*	*173*	*10·9*
Hamilton	*5,429*	*47*	*8·35*

TABLE IX.—YEARLY RATIO OF REJECTIONS OF RECRUITS FOR VALVULAR DISEASE IN THE PRINCIPAL STATIONS.

	London	Manchester	Liverpool	Birmingham	Glasgow	Dublin	Belfast	Leeds
1901	3·5	0·26	..	4·93	6·61	..	43·1	10·69
1902	5·9	2·68	..	6·79	9·15	..	39	10·8
1903	2·25	0·00	4·0	3·53	7·57	10·9	0·57	10·57
1904	5·94	2·77	2·1	11·5	9·9	6·3	3·3	7·22
1905	5·3	2·1	4·4	6·89	5·95	3·9	2·7	6·76
1906	7·97	4·02	7·3	4·88	26·44	6·6	0·00	24·58
1907	6·9	5·3	15·2	10·73	5·59	7·6	0·00	19·21
1908	9·3	11·31	15·3	9·78	13·19	5·2	1	13·88
1909	11·26	24·07	12·2	13·29	5·35	6·8	0·57	32·37
1910	10·5	4·13	7·8	22·25	3·85	7·6	3·3	7·38
Average	7·6	3·1	6·9	9·12	10·9	7·03	12·62	13·2

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LEAVES FROM A NOTEBOOK.

By Colonel R. H. FIRTH.

THE following pages present elaborations of leaves from an old notebook. The ground covered is mainly modern physical chemistry, but as it is a site upon which are built some important conceptions, theories, and practices in present day medical routine, it is possible that the notes may be of general interest. It is true the subject matter is difficult, and in some parts impossible to explain without mathematical illustration, but by putting these mathematical arguments in as simple a form as possible, it is hoped that even the ordinary reader may find the statements to be intelligible. The notes were made originally from technical literature, that is literature not usually accessible to men in the service, therefore their extension in this form may serve the useful purpose of reaching a wider circle of readers. In what follows, an attempt is made to explain the fundamental physical facts and conceptions underlying ionic medication, the interaction of toxin and antitoxin, agglutination, and catalysis or enzyme action.

I.

Those who read my article on Osmosis,[1] will have realized how the lowering of the freezing-point of a solution and the osmotic pressure are a measure of the number of dissolved units, and hence an abnormally small depression of either the freezing-point or osmotic pressure suggests a reduction in the number of dissolved units below the figure which we should expect from the amount of substance actually in solution. Any such reduction must be due to the grouping of normal molecules to form larger aggregates. Conversely, in cases where there is a great depression of the freezing-point, the explanation lies in the dissociation of the vaporized molecule into two or more simpler molecules; ammonium chloride is a case in point, where the vaporized substance breaks up into ammonia and hydrogen chloride, giving two molecules instead of one. Similarly, an abnormally high osmotic activity finds its explanation in the electrolytic dissociation theory which was

[1] Journal of the Royal Army Medical Corps, July, 1914.

discussed in my other article on Solutions.[1] By that theory, acids, bases, and salts in aqueous solution are dissociated to a greater or lesser extent into positively or negatively charged particles or ions. The hypothesis of ionic dissociation explains not only abnormal osmotic activity, but it gives an intelligible interpretation of some other phenomena. It explains why aqueous solutions of sugar or alcohol are not better conductors of electricity than water; both sugar and alcohol being non-electrolytes. It explains why common salt, nitrate of potassium, hydrochloric acid, and sulphuric acid in aqueous solution are good conductors of electricity and produce an abnormal lowering of the freezing-point; all these substances are electrolytes and subject to ionic dissociation. The degree of that dissociation, the electric conductivity and effect upon the freezing-point increases with dilution, or as the concentration of the solution decreases.

At this stage it may not be redundant to emphasize the distinction between electrolytes and non-electrolytes. The former are ionized in aqueous solution and by virtue of that ionization the solution conducts the electric current; sodium chloride is a typical example. Non-electrolytes are not ionized, they have a normal effect on the freezing-point of water, and their solutions do not conduct electricity; a typical instance is sucrose. Of course there are many electrolytes on the border line, which simply means that their degree of dissociation is very small. It has been asked, why should there be any dissociation of a molecule when its constituent elements have manifested energy to form it? It is obvious that a dissociation of the electrically charged atoms which make up a molecule must require a considerable amount of energy, and the answer to the foregoing question lies in the answer to another, or from whence is this necessary energy derived? When explaining osmosis, one referred to the big part played by hydration, and there is much evidence to show that ions are hydrated or carry with them a covering of water molecules. From this fact it is probable that the attraction of ions for water is the real motive for dissociation in aqueous solution, and that from the heat of their combination with water is derived the necessary energy for the separation of ions.

These general physical facts have an important bearing on many physiological problems and some therapeutic measures. The fluids

[1] JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, March, 1914.

which bathe our tissues are electrolytic solutions, though they contain some non-electrolytic material such as the proteins. The blood serum has an electric conductivity equal to a 0·7 per cent sodium chloride solution, but the corpuscles are non-conductors. The electric conductivity of our tissues and fluids is essentially a question of how far their constituents are ionized, and under the action of enzymes even the non-electrolytic proteins are split up into peptones and amino-acids which are ionizable. All this tends to show that electrolytes play a big part in processes associated with vital activity, and the properties of the solutions in which they exist are to be regarded as the reactions of the positive ion added to those of the negative ion, or in technical language these solutions have an additive character. From the work of Hittorf and others, it is known what is the value of the contributions which the ions of an electrolyte make to the electric conductivity of the electrolyte. Take the three elements, lithium, sodium, and potassium; the lighter metal lithium gives the most sluggish ion, while the heavier metal potassium gives the speediest ion. This is held to be due to the different hydration of the ions, the lithium ion being hydrated to the greatest extent and the size of its water envelope, by favouring friction, causes its lesser mobility.

When an electrolyte is split up by the passage of an electric current through its solution, those ions which move to the positive pole are an-ions, and those which move to the kathode or negative pole are kat-ions. Since an ion moves to one or other pole because it carries an opposite electric charge, it follows that an an-ion is negatively charged and a kat-ion is positively charged. An ion of silver differs from an atom of silver by virtue of possessing this electric charge, and as soon as the silver loses the electric charge which makes it an ion, it becomes an atom of metallic silver. In a simple salt like silver nitrate, the Ag is the kat-ion, and the radicle NO_3 is the an-ion. As both the ions are monatomic, the one carries one positive electric unit, and the other carries one negative unit. Most soluble chemical compounds are electrolytes, and also many organic compounds of analogous composition. Sugar, alcohol, chloroform, and phenol are examples of non-electrolytes. The ions of the alkali metals, of ammonia and of hydrogen have positive charges; while the ions of the acids, of the halogens and the hydroxyl ion have negative charges. In an electrolyte, through which no electric current is passing, the ions are in perpetual motion, but their movement is not in any definite direction. The moment, however, a current is sent through the electrolyte, the

movement becomes orderly and is directed towards the poles. The decomposition of an electrolyte by the passage of a current through it is directly proportional to the amount of electricity which passes, and when the same quantity of electricity passes through different electrolytes, the weight of the different substances dissociated is proportional to their chemical equivalents. The quantity by weight of substance separated by one unit of electricity, say a coulomb, which is one ampere for one second, is called the electro-chemical equivalent. Of hydrogen, it is 0.01 milligramme, and the equivalent for any ion is that multiple of the combining weight. In ionic medication, when it is wanted to know how much of an ion will be introduced into the body by a given current in a given time, both the ionic velocity and the electro-chemical equivalent must be considered. If two ions concerned have equal velocities, like chlorine and potassium, then the amount of each introduced at the two electrodes will be one half of the figures calculated from the time, current, and equivalent. If two ions have different velocities, then their share of transference will be in the ratio of the difference of their velocities.

If, in accordance with the theory of electrolytic dissociation, we conceive the passage of an electric current through an electrolyte as being synonymous with the movement of electrically charged particles or ions, then the superior conductivity of a particular ion must be due either to its carrying a greater charge or to its greater rapidity of movement. The first is untenable, as it is known that with the gramme-equivalent of each ion there is associated the same definite quantity of electricity; thus, monads carry one, diads two, and triads three charges, in no case there being a fraction. We are left only with the possibility that one ion may be faster or slower than another. From the experimentally ascertained values of ionic conductivity, the actual rates at which ions move have been determined. Thus, when the fall in electric potential through an electrolyte is one volt per centimetre, it is known that the hydrogen ion moves at the velocity of 0·0033 centimetre per second, the hydroxyl ion at 0·0018, and the potassium ion at 0·00067 centimetre per second; obviously, if the fall in potential be fifteen volts per centimetre, then the rates at which the ions move will be fifteen times as great. The mobility of an ion is manifest not only in an electric field but also when the ion is involved in a concentration gradient, that is, when the salt of which it forms a part is diffusing from places of high to places of low concentration. In the latter circumstances, the charges which the ions carry call into action

electrostatic forces between the positive and negative ions, and these limit the independence of the ions so far as their separation is concerned. It is probable that in these resulting and minute degrees of separation of the positive and negative ions of the electrolytes in the body fluids is to be found the explanation of the electrical effects which so frequently accompany vital activity.

The foregoing conception of an electrostatic attraction between the ions has a definite bearing upon the problem of permeability of living membranes to electrolytes. Suppose a membrane were permeable to the negative or an-ion but impermeable to the positive or kat-ion; under these hypothetical conditions, the salt as a whole could not penetrate the membrane as there would be a separation of the ions. This separation, we have indicated, is opposed and prevented by the electrostatic forces, and the an-ions alone could not pass through the membrane because they are held back by their positive partners. The only way the an-ions could be made to pass through such a membrane would be by adding to the solution another electrolyte having a kat-ion able to penetrate the membrane, when the kat-ion of the added salt and the an-ion of the original salt could cross the septum in electrically equivalent quantities. Or, by adding to the water on the further side of the membrane a salt for the an-ion of which the membrane is permeable, when there would be an exchange of the two an-ions also in electrically equivalent quantities. It is well known that the plasmatic membrane of blood-corpuscles is permeable to an-ions, and when carbon dioxide is passed through blood the chlorine from the serum passes into the corpuscles and the alkalinity of the serum increases. The explanation of this is that the carbon dioxide, penetrating the cell membrane, reacts with the protein contents of the corpuscles and gives rise to the carbonate ions HCO_3 and CO_3. As the plasmatic membrane is permeable to an-ions, an exchange follows between these carbonate ions and the chlorine ions in the serum, with the result that sodium carbonate is produced, accompanied by a corresponding increase of alkalinity in the sodium salt solution. One has laid stress on the fact already that any such exchange of ions must take place in electrically equivalent proportions. In the case under consideration, where the CO_3 ion exchanges with the chlorine ion, for every carbonate ion leaving the corpuscle two chlorine ions must enter. Some recent work shows that the red blood-cells are permeable also in certain cases for kat-ions, such as the calcium ion; there is, however, no complete evidence that the erythrocytes are permeable for kat-ions generally.

Both an-ions and kat-ions can be said to have specific actions or properties. If a frog's muscle be soaked in isotonic sucrose solution sufficiently long to extract all the salts from the muscle fluid, that muscle loses its power of responding to a stimulus. The power is at once restored by steeping the muscle in sodium chloride solution. Any sodium salt will restore the muscle power, as the character of the an-ion with which the sodium is associated is immaterial. A potassium salt would be inactive, showing that for the maintenance of muscular contractility the sodium ion possesses a specific function. Presumably, this specific action of the sodium or any other salt is dependent on the degree of ionization. This point was investigated by Paul and Kronig in their disinfection experiments. They worked on the germicidal powers of mercuric chloride, bromide, and cyanide, and found that the germicidal effect of the undissociated molecules and of the an-ions was negligible, but that the disinfecting power depended, not on the total concentration of the mercury salt, but on the concentration of the mercuric ion. For equal concentrations of the three mercuric salts the degree of ionic dissociation is greatest in the chloride and least in the case of the cyanide. The germicidal effects were in harmony with these gradations, decreasing from the chloride to the cyanide. The same workers have shown that when mercury salts other than the halogen salts are taken, another factor plays a part in disinfection action. This is the penetration power. Thus, mercuric nitrate is ionized to a greater extent than mercuric chloride, but it has a weaker germicidal effect, the reason being that the chloride is much more soluble in the lipoid substances of the living cell membrane and thereby penetrates more readily inside the cell than the nitrate. This same factor of a relatively high solubility of the undissociated molecule of an organic acid in the plasmatic membrane explains the high germicidal effect of acetic acid in spite of its deficiency, on dissociation, of hydrogen ions. A similar point comes out from Loeb's work on artificial parthenogenesis, in which he found that the monobasic fatty acids were far more effective in bringing about fertilization than the mineral acids, apparently because their undissociated acid molecule had a higher penetrative power on the eggs of the sea-urchin with which he was experimenting.

Another interesting point worth noting is that although generally the solubility of a salt is diminished in the presence of another salt with a common ion, as NaCl being less soluble in HCl than in pure water, the converse is not known, as silver cyanide

being more soluble in potassium cyanide and mercuric chloride in sodium chloride than in pure water. In these latter cases, complex salts are formed and the metal becomes part of the an-ion so that the concentration of silver and mercury become practically nil. This aspect is emphasized by the fact that one part of $AgNO_3$ plus two parts of KCN in four litres of water is of a less germicidal potency than a solution of one part of $AgNO_3$ in four litres of water. The toxic effect is due to the silver ion and this is practically absent from the first solution. In the same way, the germicidal power of mercuric chloride is much reduced by adding sodium chloride to the solution, because the latter causes a disappearance of the mercuric ion by converting it into a complex an-ion of feeble toxicity. So again, a mixture of copper sulphate and cane sugar fails to respond to the ordinary tests for copper, and even the addition of KOH causes no precipitate. Even plants will grow in this mixture in spite of the well-known toxicity to plant life of the copper ion. The secret of the anomaly is that it makes a great difference whether the copper is present as the copper ion or a mere part of a complex ion.

One referred just now to the germicidal action of acid. Not only in respect of that action, but in regard to other characteristics, the hydrogen ion is important, so also is the hydroxyl ion present in solutions of bases. These two ions are far and away more mobile than any others, either an-ions or kat-ions, and are associated with the yielding of water molecules. The importance of the mobility of the H and OH ions comes into prominence in practical ionic medication, where they are often found to be caustic to the skin. When a continuous current is passed through the body from metal plates, covered in the customary way with a thin layer of chamois leather or other material, these ions may produce corrosive action on the tissues. To prevent this the practice is to interpose between the metal and the skin a greater thickness of fabric, thereby delaying the passage of the caustic ions of H and of OH, and permitting a full effect from the less irritant and specific medical ions it is wished to introduce.

It will be obvious that these general notes on electrolytic dissociation must have an important bearing on the study and comprehension of ionic medication. One is unable here, and, moreover, one is incompetent, to discuss that interesting modern therapeutic method, but it is hoped that this discursive note may help generally towards an interest in and an understanding of that recent development in medical practice.

II.

Every reader of the literature upon immunity and upon the action of disinfectants has come across the statement that the reactions discussed conform to the law of mass action. The question suggests itself, how many average medical readers know what is, or really understand, the law of mass action? Confining oneself here to the problem of immuno-chemistry, the argument involves the statement that the addition of an antitoxin to the corresponding toxin resembles generally the neutralization of an acid by an alkali, but it is qualified by the fact that the amount of toxin neutralized is not proportional to the amount of antitoxin added. This brings us to the conception that the process is essentially analogous to the neutralization of a weak acid by a weak base. In this case, the dissociation of the salt interferes with the normal course of neutralization, and in a mixture containing equivalent quantities of a weak acid and a weak base there is still some free acid and free base. These are in reversible equilibrium, and it follows that by adding excess of the acid the amount of the free base is lessened, but only gradually. There is much evidence available which shows that, in a neutral mixture of a toxin and its antitoxin, a certain proportion of each exists in the free state, and the inference is that they are in reversible equilibrium, and that we are here dealing with what is called a reversible reaction and to which the law of mass action is applicable. It is towards an explanation of mass action that this note relates.

A typical non-reversible reaction is that which follows when we mix nitrate of silver with common salt. The ultimate products are chloride of silver and nitrate of sodium, and it is well known that the reaction proceeds until either the silver nitrate or the sodium chloride is removed completely, and that short of that there is no interference in the reaction, so much so, that from the resulting suspension of silver chloride in sodium nitrate solution we cannot regenerate silver nitrate and sodium chloride. A typical reversible reaction is that between acetic acid and ethyl alcohol. If we mix one gramme-molecule of each together, a reaction ensues resulting in the formation of ethyl acetate and water; but that reaction is not complete and goes on to an equilibrium point at which the mixture contains one-third gramme-molecule of alcohol, one-third gramme-molecule of acetic acid, two-thirds gramme-molecule of ethyl acetate, and two-thirds gramme-molecule of water. Now, if we mix one gramme-molecule of ethyl acetate with one

gramme-molecule of water, the reaction results in the reverse formation of ethyl alcohol and acetic acid, the reaction stopping at an equilibrium point at which the composition of the reaction mixture is the same as that stated above. In other words, the reaction is reversible. From this reversible reaction we can illustrate or explain the law of mass action.

The law of mass action states that the velocity of a chemical reaction is proportional to the molecular concentration of each of the reacting substances. Suppose we are dealing with the reversible reaction represented by $A + B \rightleftarrows C + D$ and that the equilibrium point has not been reached. In the immediate resulting mixture, the molecular concentration of the four substances can be represented as *a*, *b*, *c*, *d*, respectively. Now, the velocity of the reversible reaction will be represented by the component velocities which are V_1 or the rate at which *A* and *B* react to form *C* and *D*, and V_2 or the rate at which *C* and *D* react to form *A* and *B*. The difference between these velocities is the actual observed velocity of the whole reaction. Using the same symbols, by the law of mass action, V_1 equals abk_1 and V_2 equals cdk_2, in which k_1 and k_2 are proportionality factors or velocity coefficients for the forward and backward reactions respectively. Consequently, the difference between V_1 and V_2 is represented by the difference between abk_1 and cdk_2. Assuming that the reaction has proceeded for a period, then the molecular concentrations will be no longer *a*, *b*, *c*, *d*, but say a_0, b_0, c_0, and d_0, and the velocity of the reaction will be the difference between a_0, b_0, k_1, and c_0, d_0, k_2. Assuming next that the reaction has gone on to the equilibrium point, then the concentrations will be, say a_e, b_e, c_e, d_e, and by this time the velocity of the forward reaction will be equal to that of the backward reaction, and consequently the velocity of the whole reaction will be zero, with the result that a_e, b_e, k_1 equals c_e, d_e, k_2. Simplifying this, and writing the ratio of k_1 to k_2 as K, we can write K equals c_e, d_e / a_e, b_e. This constant K is dependent only on the nature of the reacting substances and the temperature, and independent of the concentrations of the reacting substances. K is known as the equilibrium constant, and the equilibrium formula means in plain language that, for a reversible reaction at a given temperature, the product of the equilibrium concentrations of the substances on the right hand side of the equation stand in a constant ratio to the corresponding product for the substances on the left hand side.

We can now go back to the case of the reaction between acetic

acid and ethyl alcohol, applying the equation to it. In that reaction we have stated that the equilibrium reached contains one-third volume of alcohol, one-third volume of acetic acid, two-thirds volume of the ester, and two-thirds volume of water. These respectively represent our hypothetical substances *a*, *b*, *c*, and *d*. If we write *v* as the volume of the system at the point of equilibrium, then the molecular concentration of the four substances is $\frac{1}{3}$v, $\frac{1}{3}$v, $\frac{2}{3}$v, and $\frac{2}{3}$v respectively. We have shown that *K* equals c_e, d_e/a_e, b_e, therefore $\frac{2}{3}v \times \frac{2}{3}v/\frac{1}{3}v \times \frac{1}{3}v$ equals *K* or 4. If the law of mass action is applicable to this reversible reaction, then *K* ought to have the same value even though the original proportions of acetic acid and ethyl alcohol are different. Let us imagine that one gramme-molecule of acetic acid is mixed with *n* gramme-molecules of ethyl alcohol. Suppose we write *x* for the fraction of a gramme-molecule of ethyl acetate present in the mixture at equilibrium, then the corresponding quantity of acetic acid will be 1—*x*, of alcohol will be *n*—*x*, and of water will be *x*; further, if *v* be the volume of the equilibrium mixture then the respective concentrations of acid, alcohol, ester, and water will be 1—x/v, n—x/v, x/v, and x/v. Applying the same formula, we obtain the statement that $K = \dfrac{\frac{x}{v} \times \frac{x}{v}}{\frac{1-x}{v} \times \frac{n-x}{v}}$ and this simplified becomes $K = \frac{x^2}{(1-x)(n-x)}$. In an actual case the amount of free acid is readily determined by titration and the value of *x* obtained, and as the value of *n* is known it follows that the value of *K* is readily calculated. Thus say, from the free acetic acid found in a particular reaction that *x* is 0·423 and that the value of *n* is 0·5, then by the formula the value of *K* is 4. The accuracy of the formula has been tested in a number of actual reactions between acetic acid and ethyl alcohol and the same value for *K* obtained. Conversely, taking *K* as 4 and knowing what *n* is in any particular reaction, the calculated value of *x* agrees closely with what it is found to be from the observed amount of free acid. Thus, in two actual cases, where *K* being 4 and *n* was 0·67 and 8, the observed values for *x* were 0·519 and 0·966 as against 0·528 and 0·945, as calculated by the theoretical formula. The reader who cares to verify the formula, by taking *K* to be 4 and calculating for any value of *n* what the value of *x* ought to be, will find the operation a simple but excellent test as to how rusty his knowledge of algebra has become. The fact is, a remarkable agreement is found showing that the applicability of the mass action law holds good for this typical reversible reaction between

acetic acid and ethyl alcohol. For each reversible reaction, this formula is applicable, each having a characteristic constant or K which defines the relationship between the reacting substances at the point of equilibrium.

Reverting to some immunity phenomena, it is well known that ammonia is a hæmolytic agent and lakes blood, and that boric acid has no such action. Presumably, if we gradually neutralize ammonia by boric acid there should be a decreasing hæmolytic activity, and the laking power or toxicity of a mixture of ammonia and boric acid for blood should be a measure of the free ammonia which it contains. This is found to be the case, and that a mixture in which there are equivalent quantities of ammonia and boric acid still contains free ammonia, and that the addition of an equivalent quantity of boric acid to ammonia does not give a mixture which is non-toxic to red blood-corpuscles. This is tantamount to showing that in a solution containing equivalent quantities of a weak base and a weak acid there is left some free base and free acid; in other words it is a case of reversible equilibrium to which the law of mass action may be applied.

When a neutral mixture of a toxin and its antitoxin is examined, it is found that a certain proportion of each exists in the free state. Craw's[1] work on the lysin obtained from cultures of the *Bacillus megatherium* is full of suggestion in this respect, as he showed that both neutral mixtures and those with excess of antilysin contain free lysin, also that both neutral mixtures and those with an excess of lysin contain free antilysin. The term neutral mixture here means one which does not hæmolyse in the standard time. From the evidence, we draw the conclusion that these mixtures are in reversible equilibrium with some compound formed by the union of lysin and antilysin, and that to them the law of mass action is applicable. It is true this view has been challenged, but the general evidence, voiced as it is by so competent a worker in this field as Arrhenius, points to the general accuracy of the inference. In various cases, the neutralization of a toxin by its antitoxin has been investigated from this standpoint and the course of neutralization found to be in harmony with an equilibrium formula for a reversible reaction, similar to that explained. Arrhenius gives the equation for the reaction between toxin and antitoxin as being one molecule of toxin plus one molecule of antitoxin $\rightleftarrows$ two molecules of toxin-antitoxin compound. My own views in a question like this

[1] *Journal of Hygiene*, 1905, v, p. 113.

may be of doubtful value, but mathematical analyses of several series of figures published, giving the amounts of free toxin and free antitoxin found in actual experiments, make me doubt the legitimacy of applying the law of mass action in its entirety to these reactions. That they are reversible reactions is most probable; equally, the figures conform to mathematical equations closely fitting the law of mass action, but the admitted complexity of the substances taking part in the reactions demands some caution or hesitation before we can be dogmatic as to their physical chemistry.

III.

In the foregoing note, we have considered the reversible nature of some immunity phenomena. That conception involves the view that the substances are in true solution and definitely diffusible, as held by Arrhenius and many other advanced workers in immuno-chemistry. There are, however, some who regard toxins and anti-toxins as being suspension colloids, and consider that the relation between them is one of adsorption equilibrium. Certainly the phenomena of agglutination lend much support to this attitude, and this note may be regarded as an attempt to discuss the physico-chemical aspects of agglutination from that point of view.

The situation may be clearer if we realize that when a substance is shaken up with two liquids which do not mix readily, some of it is found to be dissolved in one and some in the other layer, or, in technical language, distributed between the two phases. Assuming equilibrium is established, the amount of the substance found in each liquid layer will depend upon the volume of each liquid taken. This complication can be eliminated and a definite measure of the distribution obtained, if we compare the weight of the substance per unit volume of the layers, or the concentrations as they are called. Suppose C_1 is the concentration of the substance in the first layer and C_2 is its concentration in the second, then the ratio C_2/C_1 is the ratio of distribution or partition coefficient. This coefficient is independent of the concentrations or absolute values of C_1 and C_2, provided that the molecular condition of the dissolved substance is the same in each of the two liquids. It is curious to note that this rule of independence of concentrations is really the same as Henry's law dealing with the absorption of a gas by a liquid under varying pressure. Those who read my article on the subject of Osmosis will see

here another instance of what was therein pointed out, namely, the parallelism between gases and liquids. Such distribution is a physical process and only rarely can it be regarded as chemical. Moreover, any equilibrium of distribution which is established is reversible, that is it can be affected from both sides.

If the molecular condition of the dissolved substance is not the same in the two liquids, then the value of the ratio C_2/C_1, is not independent of the concentration, but becomes C_2^n/C_1, where n is the number of times the molecular weight of the dissolved substance in one liquid is greater than its molecular weight in the other. An example may make this clearer. The molecular condition of acetic acid is twice as great in water as in pure benzene, and n in this case is 2; therefore, if C_1 is the concentration of the acid in benzene and C_2 the concentration in water, the ratio between those two liquids will be C_2^n/C_1, and in that form is independent of concentration. Thus, in two actual estimations, C_1 was 0·043 and 0·071 while C_2 was 0·245 and 0·314, consequently C_2^n/C_1 is respectively 1·40 and 1·39, whereas C_2/C_1 is respectively 5·7 and 4·4, showing agreement in one case but not in the other.

Reverting to the phenomena of agglutination, we are concerned with the behaviour of a solid, represented by the bacteria, in a solution represented by diluted serum, and the influence of the surface of the solid in taking up something from the solution suggests adsorption rather than absorption. Adsorption is well represented by what happens when we shake carbon in a dilute solution of acetic acid. The concentration of the solution falls very rapidly until it reaches equilibrium, and the taking up of the acid by the carbon is a process in which the surface of the carbon is mainly concerned. Experiments show that the amount of acid taken up by the carbon increases proportionally to the cube root of the pressure, and is relatively more complete in dilute solutions; further, if we write x for the concentration of the acid in the carbon and P for pressure, the relationship between the concentration of acetic acid in the solution and in the carbon is expressible by the general formula $x / \sqrt[3]{P}$. If we further write C_e to represent the equilibrium concentration of the acid in the liquid or solution and C_s as the corresponding concentration of the acid in the solid or carbon, the general adsorption formula becomes $C_s = BC_e^{\frac{1}{P}}$, in which B and P are constants for a given temperature

and a given dissolved substance. Obviously, the values of these vary, but in the case of our example are known respectively to be 2·606 and 2·35. Supposing that the concentration of acetic acid in the liquid is 0·267, then C_s or the amount adsorbed by the solid carbon will be expressed by $2{\cdot}606 \times 0{\cdot}267^{\frac{1}{2\cdot35}}$ or 1·49. If we take a case where C_e is 0·0181 then C_s will be 0·474, or even another example when C_e is 0·8817 then C_s will be 2·47; these two examples are taken from actual experiments in which the observed values of C_s were respectively 0·467 and 2·48, showing that theory and practice agree remarkably closely. The reader who wishes to check these figures will find the effort an excellent test by which to rub up his mathematical knowledge. In this and other instances of adsorption, surface condensation plays the main part, and on thermodynamical grounds, the most stable condition of any solution is the one characterized by a minimum surface tension. Hence, if a solute lowers the surface tension of a solvent, it will accumulate in the surface layer of the solution. A recent paper by Macallum[1] goes so far as to maintain that surface tension is the prime factor in such vital phenomena as secretion, excretion, cell diffusion, and muscle contraction. He uses the micro-chemical study of the distribution of inorganic salts in the cells as the index of differences in the surface tension of living tissues.

We arrive then at this position, and can say that the equilibrium between solid phase and a solution in which it is immersed is characterized by a localized concentration of the dissolved substance at the surfaces of the solid phase, and the equilibrium is therefore an adsorption equilibrium. These facts find expression in the general adsorption formula of $C_s = BC_e^{\frac{1}{P}}$ where P is greater than unity. The extent of the adsorption effect will of course depend on the surface area of the adsorbing solid, and to some extent on the nature of the dissolved substance and on its electrical character. Since surface development is a preliminary condition, it is not surprising to find colloids associated with adsorption effects, and where mixtures of colloids and ions are involved, as in living cells and proteins generally, the equilibrium between them partakes largely of an adsorption equilibrium. In the phenomena of agglutination of bacteria, the relation between the amount of agglutinin taken up by the bacteria and the amount

[1] *Proc. Roy. Soc.*, 1913, 86, 527.

which remains in solution lends itself to the application of the general law and formula for an adsorption equilibrium. Taking the figures and work of Eisenberg and Volk[1] as a basis on which to examine the proposition, we find that they added given volumes of agglutinin solution to equal quantities of bacterial suspension with the result that equilibrium was reached rapidly. They determined the distribution of the agglutinin by centrifuging, and then estimated the amount of agglutinin left in the clear liquid by determining the extent to which it had to be diluted before it ceased to produce agglutination under given conditions. Further, they added definite quantities of agglutinin in arbitrary units to the bacteria, and then determined the quantities of agglutinin left in the solution after agglutination. The difference between the amounts represented the quantity of agglutinin taken up in each case by the bacteria. Their results show clearly that the more dilute the solution the more completely is the agglutinin taken up by the bacteria. Further, the relation between the agglutinin taken up by the solid phase or bacteria, here written C_s and the agglutinin still in the liquid and written C_e conforms to the general formula of $C_s = BC_e^{\frac{1}{P}}$, where B is 24·7 and $\frac{1}{P}$ is $\frac{2}{3}$. Thus, when 200 units of agglutinin were added, 20 were found by observation to be in the solution and 180 taken up by the bacteria; whereas by the formula the value of C_e would be 19·7, a very close agreement. Similarly, when 400 units were added, the observed value of C_e was 60 as compared with a value of 53 worked from the formula. So again, when 2,000 and 10,000 units of agglutinin were added, the respective observed values of C_e were 500 and 9,000, as against 478 and 9,166 calculated from the formula. The agreement is marked in the case of the more dilute solutions, but the error is considerable in the higher concentrations. Whether we are wholly justified in regarding the empirical formula of adsorption as precisely expressing the nature of the equilibrium between bacteria and agglutinins is open to doubt, owing to the substances involved being so complex and the agglutinins being specific and of very varying activity. In spite of this doubt, we must admit that the facts go far towards supporting the view that the general adsorption formula meets the case of the relationship between bacteria and agglutinins. Arrhenius rejects the adsorption theory and questions the idea of agglutination being due to a special surface action. He explains the phenomena on the assumption that the

[1] *Ziet. für Hygiene*, 1902, 40, 155.

bacterial cell contains a good solvent for the agglutinin, and deduces the view that the molecular weight of the agglutinin in the solvent is one-third of the molecular weight of the agglutinin in the surrounding fluid. One is tempted to regard the question as still open to a definite answer.

IV.

It is common knowledge that many chemical reactions which normally proceed slowly may be much accelerated by the introduction of some foreign material. In the arts and manufactures, this is of vast importance as it enables the technologist to effect readily reactions which otherwise would be either impracticable or commercially non-economic; examples are to be found in sulphuric acid manufacture, in chlorine making, in salt-cake production, and the recovery of sulphur from alkali waste. The amount of this foreign material may be and usually is very small, as a rule it does not take any prominent part in the chemical changes, and it may be recoverable at the end of the reaction changes. Such a foreign substance or material is called a catalyst, and the behaviour of the catalytic agents interest us as doctors in that they play a big part in the chemical changes taking place in the living organism, and those catalysts which are concerned in metabolism are the enzymes, between which and the inorganic catalysts there is a close analogy.

Reactions may be divided into two groups, (1) the ionic which are instantaneous, and (2) those like the saponification of fats which take an appreciable time to attain equilibrium. The catalyst is concerned only with the second group. The study of catalysis is possible only on the basis of the law of mass action. In a former note, it has been shown that by that law the equilibrium constant for a reversible reaction is equal to the ratio k_1/k_2, where k_1 is the velocity coefficient of the forward reaction and k_2 is that of the backward reaction. If *a* and *b* represent the molecular quantities of any two substances *A* and *B* which were mixed initially, and if after an interval of any time *t* the molecular quantity of *C* and *D*, or the product of the interaction of *A* and *B*, be expressed as *x*, then the velocity of *V* of the reaction at this interval of time from the start will be given by $V = k_1 (a-x)(b-x)$; and this represents the rate of change in the equation $A + B \rightleftarrows C + D$, when the change proceeds until either *A* or *B* has disappeared. Assuming that the catalyst does not appear in the product of the reaction, the final state must be independent of the catalyst or, in other words the catalyst influences only the rate at which the condition of equilibrium

has been reached, but not the position of equilibrium itself. This being so, it follows that the forward and backward reactions must be accelerated in the same proportion. A number of experimental estimations of the facts show this to be true.

As a matter of fact, the velocity of the reaction is the rate at which x is increasing with the time dx/dt, as it is written in the language of the differential calculus. Therefore, we can say dx/dt equals k_1 (a—x) (b—x). Let us think what happens in the case of the inversion of sucrose in the presence of the catalyst hydrochloric acid, the latter being found unaltered when the reaction is over. Owing to the reaction being in aqueous solution, the formula can be simplified, as the water which actually disappears in the reaction is but a small fraction of the total water present. Therefore, we can neglect x in comparison with b and write dx/dt equals k_1 (a—x)b. But k_1b represents a variable constant and can be written as simple k, hence we can simplify further and write the formula as dx/dt equals $k(a—x)$, where dx is the amount of change in the interval of time dt, and $a—x$ is the amount of unchanged sugar, while k is a constant varying for each experiment. The formula can be further simplified and written $dx/a—x$ equals kdt, since for a given interval of time the amount of change must be a constant fraction of the unchanged sugar present. Taking the figures published by Armstrong and Caldwell[1] as to the amount of sucrose inverted by hydrochloric acid at 20° C., we find that the amount of unchanged sugar at the end of unlimited time was expressed by 7·18° of rotation. They started with a solution of 17·1 grm. of sucrose per one hundred cubic centimetres, and at zero time its rotation or a was 21·55°, after fifteen minutes the rotation was found to be 20·4° or a decrease of 1·15° or dx in that interval of time or dt. The average or mean rotation of the solution in the fifteen minutes will clearly be half of 21·55° plus 20·40° or 20·97° which represents $a—x$, and this plus the 7·18° for residual unchanged sugar gives 28·15° as the index of the mean amount of unchanged sucrose present during this interval of time, and the ratio of the amount of change in these fifteen minutes to the unchanged sucrose present is 1·15/28·15 or 0·04. Similarly, the degrees of rotation at 120 and 135 minutes were found to be respectively 13·75° and 12·95° or a decrease of 0·8°. The average rotation of the solution in that fifteen minute interval was obviously 13·35°, and the amount of unchanged sugar present was that plus 7·18° or 20·53°. The ratio of the amount of change in this fifteen minutes is therefore 0·8/20·53 or 0·039, a figure

[1] *Pro. Roy. Soc.*, A, 1905, 74, 199.

practically identical with the ratio for the other fifteen minutes. The example is quoted as confirming theory, and that the amount of change by the action of the catalyst in a given interval of time is a constant fraction of the unchanged material present.

Although the position of equilibrium is independent of the nature and amount of the catalyst, the relationship between the value of the velocity coefficient for a given reaction at a given temperature is affected by the concentration of the catalyst. In the majority of cases, the relationship is a linear one, that is the velocity coefficient is directly proportional to the concentration of the catalyst; but, in some cases when the concentration of the catalyst is doubled, the velocity of the decomposition is trebled, as exemplified by the influence of colloidal platinum in promoting the decomposition of hydrogen peroxide.

One has laid stress on the mathematical theories explaining the action of inorganic catalysts as, if understood, they explain to a large extent the action of enzymes which are catalysts analogous to those of the inorganic class. For instance, there is the same likeness between the small quantity of hæmase able to decompose hydrogen peroxide and the corresponding action of colloidal platinum; similarly, between invertase and hydrochloric acid for the inversion of sucrose. Enzymes resemble further the inorganic catalysts in that, when the reaction is a reversible one, they promote both the direct and reverse changes. Thus, if lipase is allowed to act on ethyl butyrate in the presence of water, partial hydrolysis into butyric acid and ethyl alcohol takes place and, commonly, if the lipase be allowed to act on an aqueous mixture of butyric acid and ethyl alcohol the ethyl butyrate is formed. Moreover, the analogy is emphasized by the fact that the enzyme reaction is in harmony with the law of mass action, as shown by a mathematical analysis of the sequence of events during the decomposition of hydrogen peroxide under the influence of hæmase. On the other hand, there are some peculiarities of enzyme action. Thus, in the inversion of sucrose by invertase the law of mass action is departed from in that when a constant amount of invertase is allowed to act for a given time on varying, but comparatively large, amounts of sucrose in a constant volume of solution, instead of inverting a constant fraction it inverts a constant weight of sucrose in the given time. So again, in the hydrolysis of milk sugar by lactase and the hydrolysis of starch by diastase, the amount of change induced by the enzyme is, in the early periods, approximately a linear function, but becomes subsequently a logarithmic function of the time. Again, enzyme action does not always remain con-

stant throughout the whole course of the changes which it induces. In these cases, the activity of the enzyme and the value of the reaction velocity coefficient is reduced by the products of change, and when these are removed its activity is restored. The retarding influence of the products of change would seem to be a specific influence depending on some special relationship between the degree of similarity in the molecular configuration of the enzyme and the substance undergoing change under its influence. The fermentation of glucose by yeast juice illustrates still more the complicated nature of organic enzyme action as compared with changes accelerated by inorganic catalysts. It has been found that the ferment in yeast juice needs the presence of what may be called a co-ferment before it can display its activity. This co-ferment is not destroyed by boiling, but during the process of fermentation resulting from the combined action of the ferment and co-ferment the latter disappears.

Interesting as these facts may be, they are associated intimately with the question, how does a catalyst act? In the present state of knowledge it is not easy to give an answer, but the drift of present-day opinion is in favour of the view that a catalyst is effective because it forms some kind of combination with the substrate or substance undergoing change under its influence. It is supposed that this intermediate compound then breaks up into the final products of the change, the catalyst being liberated; if this be true, then the formation and decomposition of the intermediate body or compound must occur very rapidly. Although we may with some confidence assume the formation of intermediate compounds in enzyme action, it is impossible to specify their nature. This reservation is emphasized by the fact that catalytic reactions may be homogeneous or non-homogeneous. A good instance of the latter is the union of hydrogen and oxygen under the influence of platinum black. Here the catalyst is a solid, but both the reacting substances are gases; in other words, the system is a two-phase one, and in such a case there is the possibility of a surface concentration and adsorption action; if so, then the whole reaction would be more physical than chemical in type.

The importance of the concept of homogeneous and non-homogeneous systems is brought out by a consideration of the effects of temperature upon enzyme action. It is well known that the velocity of a chemical reaction increases rapidly as the temperature rises, and so far as reactions in homogeneous systems are concerned the velocity is doubled or trebled for a rise of 10° C. Reactions of the most varied nature conform to this general rule,

so much so that it may be accepted that the average of the temperature coefficient for a reaction in a homogeneous system lies between two and three. For a non-homogeneous reaction, the value of the temperature co-efficient is considerably lower, or 1·3 for a rise of 10° C. The relation between temperature and enzyme activity is complicated to some extent by the occurrence of what appears to be an optimum temperature. The existence of such a point and the falling off in the velocity of these reactions at the higher temperatures may be due to the destruction of the enzyme; whatever the explanation, any diminution in the effective quantity of the catalyst more than counterbalances the increase in the velocity which rise of temperature invariably brings about.

How far these elaborated notes will appeal to, or be understood by, the average soldier-doctor it is impossible to say. But this much is clear: it is essential, if we are to be considered a scientific corps, that the individual members of that corps approach the technical acts of their profession from the scientific side and understand the physico-chemical theories and laws which underlie and explain their routine methods. One admits that the attack from this side is difficult, especially for men untrained in elementary mathematics or methods of inductive reasoning. If there be a lack of training in these matters, the fault lies with the scholastic curriculum upon which the medical education is too often built. The existence of the difficulty, however, removes in no way the necessity; it forces home rather the conclusion that, to be and remain a scientific corps, we must as individual members perfect our knowledge in these matters. One writes as a man who has nearly run his course in the service, but all the same, one writes as a man having experience and sufficiently interested in the future of the service in which he has spent the best years of life to be able to look ahead, and anticipating the demands of the future, to urge preparedness. Possibly, one is but a preacher in the wilderness; still one is jealous of the scientific repute of the service and, moreover, not free from anxiety that the essentially scientific side of our profession may be overlooked and sacrificed to other essentials whose dominancy finds its chief excuse in facility of acquirement. It is true all men do not think alike, and perhaps one's attitude may not find general support, still, one has concepts of duty, and one of those concepts takes the form of working up dry and difficult subjects, carrying with it an impulse to share thoughts and knowledge with others. To that impulse must be attributed the elaboration of these notes.

AN EFFICIENT METHOD OF DETERMINING BY CHARTS THE CLASSIFICATION OF WOUNDED AND THE MATERIAL AND TIME REQUIRED FOR THEIR TRANSPORT.

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Royal Army Medical Corps.
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The problem of the provision to be made for wounded is one which has always been of great interest to me, and I presume that it must be of equal interest to all officers of the Royal Army Medical Corps. In my study of the subject I was particularly impressed by the definite proportion of casualties to the troops engaged in battle and the definite proportion of each class of casualties to one another as given in Field Service Regulations, and it occurred to me that these could be made up to scale in the form of charts. I tried in the first instance to approach the problem from the point of view of the medical officer who has to arrange in advance for probable casualties, and as a result I constructed my first chart. On its completion various other possibilities occurred to me, and working on official data in Field Service Regulations and the official books of the Army Service Corps, I evolved a series of charts which deal with the wounded and their transport from the battlefield to a clearing hospital.

The first of these charts, estimated on a basis of casualties equal to 5 per cent of the troops engaged, gives the definite number of cases requiring lying-down and sitting accommodation. These numbers can be ascertained from a given number of troops, or a given number of casualties, or of wounded. Other charts deal with material required for transport and the time taken to clear the field. The last gives the proportion of cases at the clearing hospital. The figures are based on the following official data: 20 per cent and 80 per cent are killed and wounded respectively. Of the wounded 20 per cent are able to walk, 60 per cent require sitting accommodation, 15 per cent require lying-down accommodation, and 5 per cent are unfit to be moved. The manner in which these percentages have been arrived at is very clearly brought out in Surgeon-General W. G. Macpherson's excellent lecture delivered at the Staff College, Camberley, on December 14, 1907.

Chart A.

This chart is for the purpose of estimating and classifying the casualties from the number of troops engaged in action, the casualties being estimated as 5 per cent of the troops engaged.

The vertical lines represent troops grading from an infantry battalion to a division; each of the heavier vertical lines represents 500 troops, and the lighter 100 troops. The horizontal lines represent the casualties, grading from 0 to 500; the heavier horizontal lines represent 25 casualties, and the lighter 5 casualties. The two upper radiating lines represent the total casualties and total wounded respectively; while the five lower radiating lines subdivide and classify these in the proper proportions for the purpose of transport into the number of cases requiring lying-down and sitting accommodation, etc. It also gives the number killed, able to walk, and unfit to be moved.

To read the chart.—The point at which the radiating and vertical lines intersect the horizontal lines gives the result. Take, for instance, 6,000 troops engaged. The vertical line at 6,000 troops cuts the total casualties line at 300, the total wounded at 240, the sitting cases at 144, the killed at 60, those able to walk at 48, the lying-down cases at 36, and the unfit to be moved at 12. Then, again, if we are given the total casualties as 300 we find that the troops engaged are 6,000 and the subdivision of casualties is as already stated. Should the percentage of casualties be other than this it is easy to estimate from the 5 per cent basis.

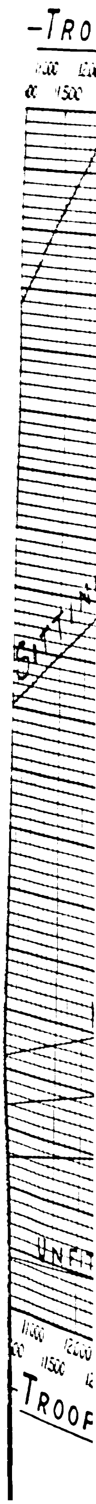
Chart A 1.

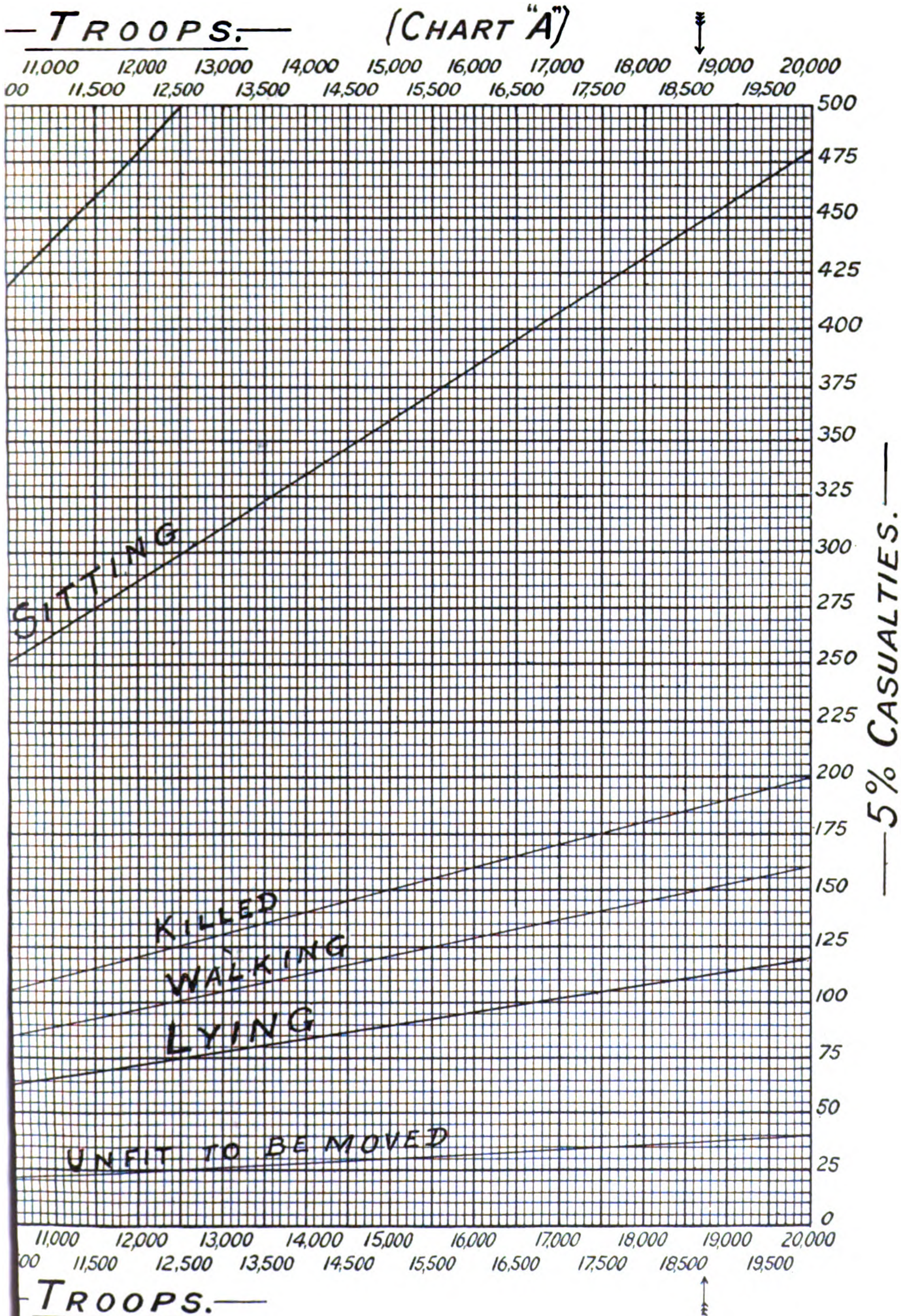
Chart A 1 is an extension of Chart A in order to complete the radiating lines representing casualties and wounded, and is to be used in conjunction with Chart A when the casualties are over 500.

Chart B.

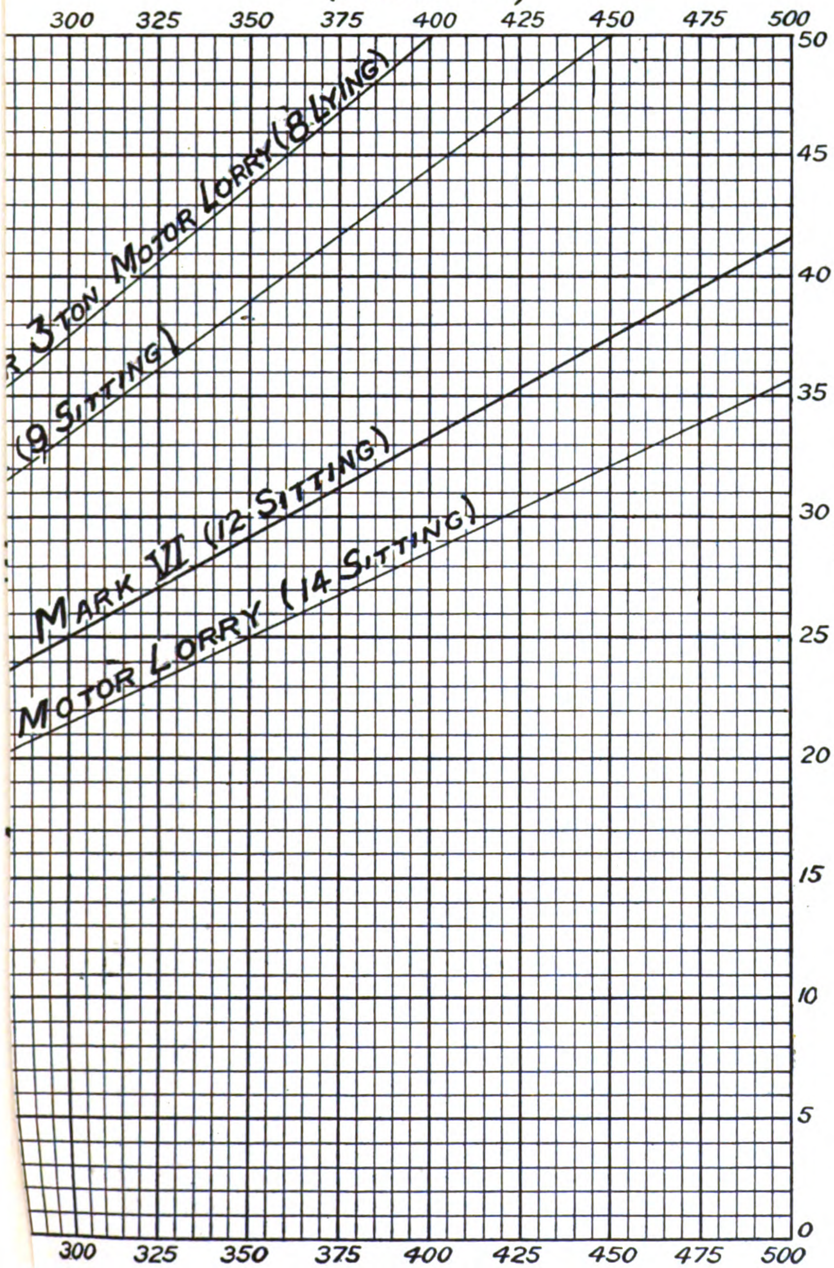
Chart B is for the purpose of estimating the number of wagons required for the transport of wounded, and follows Chart A which has given us the number of wounded in their definite proportions.

The vertical lines represent wounded, grading from 0 to 500, each of the heavier vertical lines representing 25 wounded, and the lighter 5 wounded. The horizontal lines represent the wagons, grading from 0 to 50. The heavier horizontal lines represent 5 wagons, and the lighter 1 wagon. The radiating lines show the different kinds of wagons, etc., classified according to their accommodation for lying-down or sitting cases, the upper three being for lying-down cases and the lower four for sitting cases.




TROOPS.
(CHART "A")
11,000 12,000 13,000 14,000 15,000 16,000 17,000 18,000 19,000 20,000
11,500 12,500 13,500 14,500 15,500 16,500 17,500 18,500 19,500
500
475
450
425
400
375
350
325
300
275
250
225
200
175
150
125
100
75
50
25
0
5% CASUALTIES.
SITTING
KILLED
WALKING
LYING
UNFIT TO BE MOVED
TROOPS.

(Chart "B")



Ambulance Wagons.

To read the chart.—The point at which the radiating, vertical, and horizontal lines intersect gives the number of wagons required. For example: 100 lying-down cases would require 50 Mark I ambulance wagons, or 33 to 34 G.S. wagons or thirty-cwt. motor-lorries, or 25 Mark V or VI ambulance wagons. Take again: 300 sitting cases would require 38 Mark I ambulance wagons or thirty-cwt. motor-lorries, or 34 G.S. wagons, or 25 Mark V or VI ambulance wagons, or 22 three-ton motor-lorries.

This chart is of further interest in that it gives the accommodation of all classes of vehicles officially used in the transport of wounded. It is also of use in ascertaining the number of civilian wagons and carts that would be necessary in the event of ambulance wagons not being available. The carrying capacity of these civilian vehicles is arrived at by a comparison with the accommodation provided by G.S. wagons or motor-lorries as given in the chart.

Chart C (Right).

The right half of Chart C is for the purpose of estimating the time a horse will take to make one return journey according to the distance and rate of travel.

The vertical lines indicate time in hours and fractions of an hour to make one return journey, varying from 0 to 8 hours. The horizontal lines indicate in miles and fractions of miles, varying from 0 to 10 miles, the distance between bearer division and dressing station or dressing station and clearing hospital. The radiating lines indicate the varying rate at which a horse would travel, given as 2½, 5, 7½, and 10 miles per hour respectively, this variation being dependent on the condition of the roads, etc., also upon the time available to do the return journey.

Note.—In this chart there is no time allowed for loading and unloading, but to allow for that it would be better to take the next lower speed to that at which the horse would be travelling. For example: Find the shortest time in which a wagon can make a return journey of 5 miles out on average roads. In this case time is of importance, and a horse on average roads can do 7½ miles per hour, but to allow for loading and unloading assume 5 miles per hour. The chart in this case would show two hours to do the return journey.

Chart C (Left).

The left half of Chart C is for the purpose of estimating the number of return journeys which a horse can do in a day, according to the condition of roads and distance to be travelled.

The vertical lines show the total distance varying from 10 to

30 miles which a horse can do in a day, the variation being dependent on the condition of the roads, etc. Thus, if the roads are bad, a horse may only be able to do 15 miles, or less, per day; if on the other hand the roads are specially good, a horse might do up to 30 miles per day. The horizontal lines indicate in miles and fractions of miles the distance between bearer division and dressing station, or between dressing station and clearing hospital. The radiating lines indicate the number of return journeys that can be performed according to the distance out and the condition of the roads.

To read the chart.—Find the intersection of the vertical line (which represents the total distance per day) with the horizontal line (which represents the distance out), and take the nearest radiating line to that point) which will give the number of return journeys. For example: The bearer division is 4½ miles out and the roads are in average condition, in which case the total distance might be taken as 20 miles per day; the point of intersection between the 4½-line and the 20-line lies much nearer the radiating line marked 2 journeys than the radiating line marked 3 journeys, in which case two return journeys would be taken as the possible number.

Chart D.

Chart D is for the purpose of classifying the wounded and estimating their numbers at the clearing hospital. It is estimated on a basis of casualties equal to 5 per cent of the troops engaged in battle and is based on the following official data: Ten per cent of casualties will be slightly wounded and should be retained in field medical units, and 70 per cent require hospital treatment. Of this latter category 70 per cent will require treatment in units on the lines of communication, and 30 per cent would require to be evacuated to home territory.

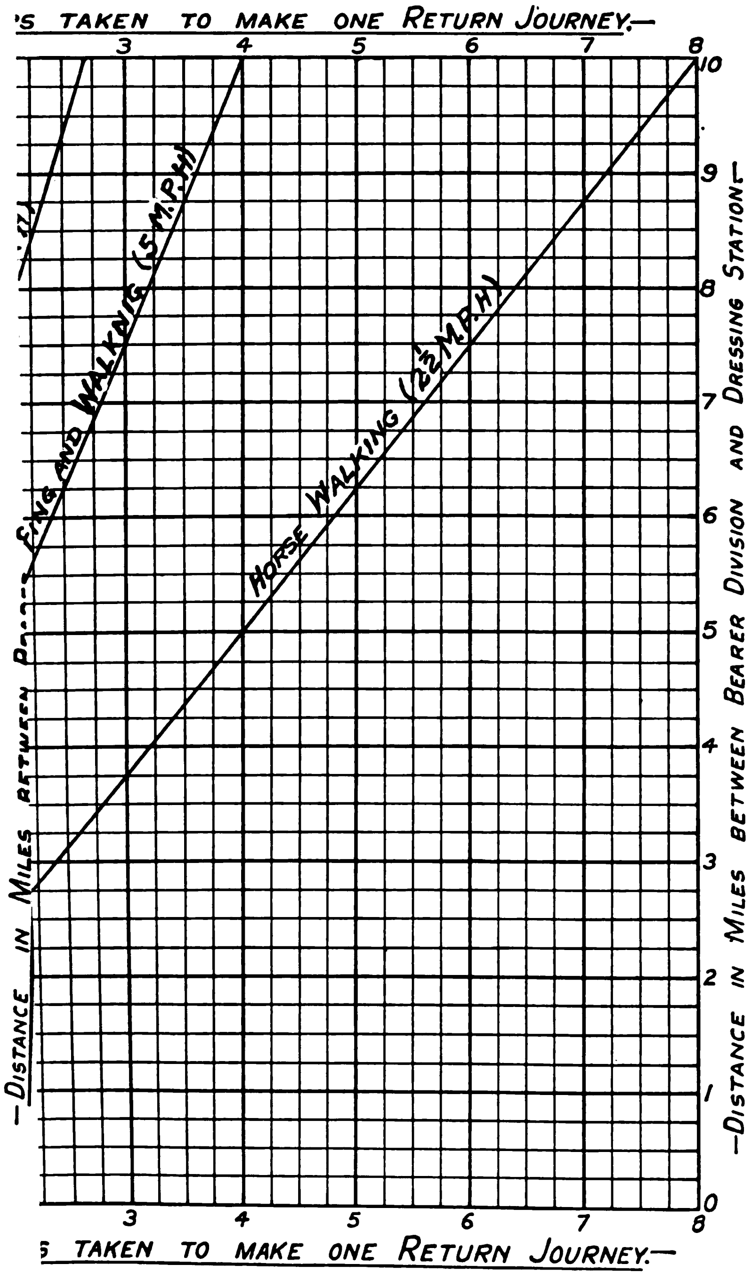
Example I.—An infantry brigade (4,110 men) is engaged about 5½ miles out (very good roads); casualties are 5 per cent of the troops engaged. Find the number of heavy wagons required, also the shortest time needed to clear the field:—

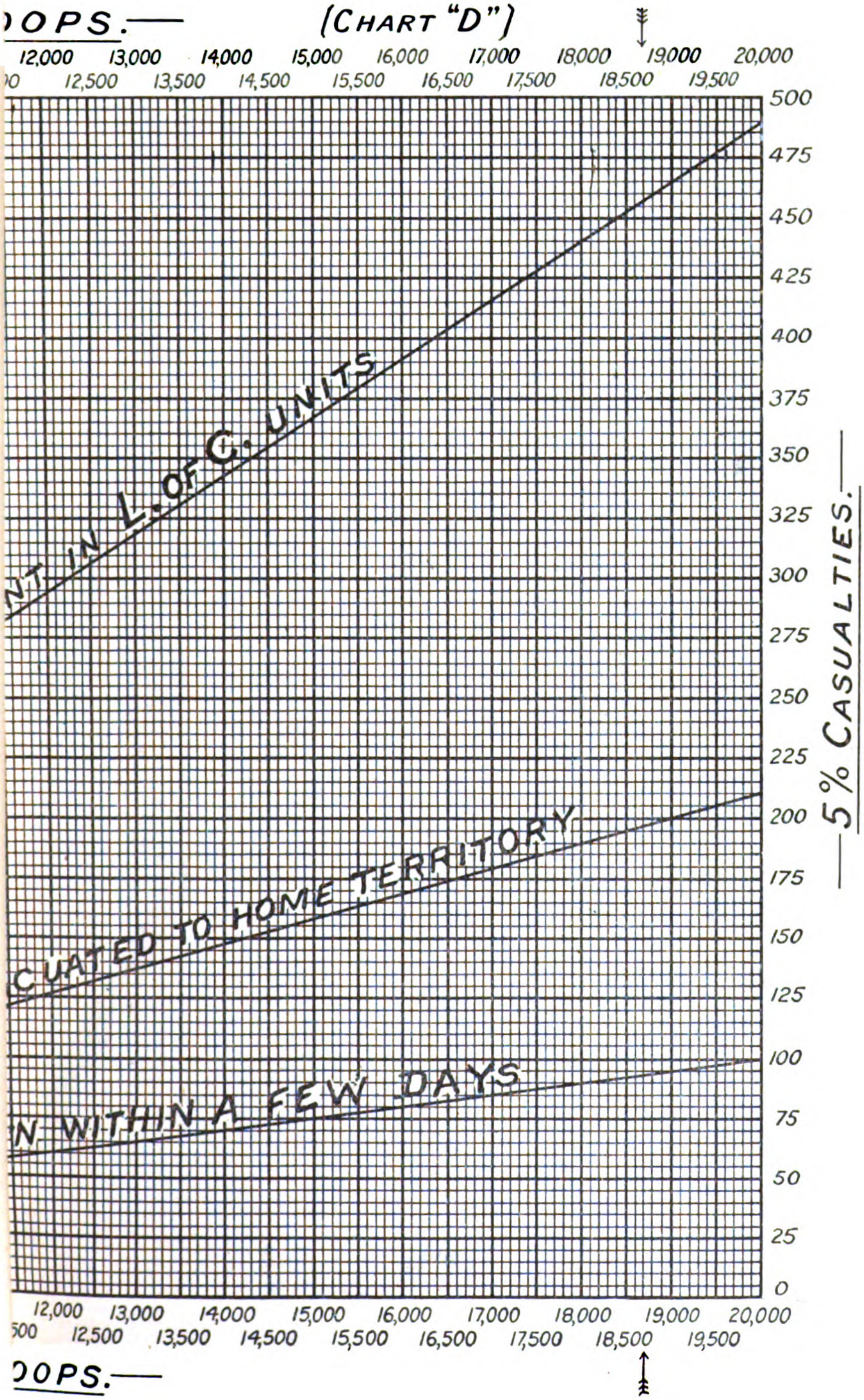
Chart A gives 100 sitting cases; 25 lying cases.

Chart B gives 8½ sitting wagons; 6½ lying wagons: say 15 wagons (Mark V or VI).

Chart C (right).—Because the roads are good and time is of importance a horse might travel at 10 miles per hour, but to allow for loading and unloading assume 7½ miles per hour. This chart will show an hour and a half as the time required.

Example II.—Seven thousand troops are engaged about 3 miles


'S TAKEN TO MAKE ONE RETURN JOURNEY.—
3
4
5
6
7
8
10
9
8
7
6
5
4
3
2
1
0
—DISTANCE IN MILES BETWEEN BEARER DIVISION AND DRESSING STATION.—
—DISTANCE IN MILES BETWEEN
HORSE WALKING (2½ M.P.H)
AND WALKING (5 M.P.H)
3
4
5
6
7
8
S TAKEN TO MAKE ONE RETURN JOURNEY.—



OPS.—
(CHART "D")
12,000 13,000 14,000 15,000 16,000 17,000 18,000 19,000 20,000
12,500 13,500 14,500 15,500 16,500 17,500 18,500 19,500
500 475 450 425 400 375 350 325 300 275 250 225 200 175 150 125 100 75 50 25 0
NT IN L. OF C. UNITS
CUATED TO HOME TERRITORY
N WITHIN A FEW DAYS
—5% CASUALTIES.—
OPS.—

out (good roads); casualties expected to be 20 per cent of the troops engaged. Find the number of heavy wagons required to clear the field in one day:—

Chart A gives 168 sitting cases; 42 lying cases.

Chart B gives 14 sitting wagons; $10\frac{1}{2}$ lying wagons: say 25 wagons (Mark VI).

Chart C (left) gives 4 journeys at 3 miles out with good roads.

$\therefore$ Number of wagons required would be $25 \div 4 = 6\frac{1}{4}$ wagons.

These $6\frac{1}{4}$ wagons are for 5 per cent casualties, but in this example the casualties are 20 per cent of the troops engaged.

$\therefore$ Number of wagons $= 6\frac{1}{4} \div 5 \times 20 = 25$ wagons (Mark VI).

Example III.—There are known to be 950 casualties after an engagement 5 miles out (indifferent or average roads). There are available 30 wagons (Mark VI). Find how many civilian wagons (on a G.S. wagon basis) that would be required to clear the field in one day:—

Chart A 1 gives the troops as 19,000 for 950 casualties.

For 19,000 troops Chart A gives 456 sitting cases, 114 lying cases.

Chart C shows for 5 miles out and average roads that each wagon will be able to make 2 return journeys per day.

Thirty wagons, at 2 journeys each, will give a total of 60 journeys. All the serious or lying cases would be taken in the Mark VI wagons.

Chart B gives $28\frac{1}{2}$ journeys to convey all the lying cases, leaving $31\frac{1}{2}$ journeys of the Mark VI wagons to convey as many as possible of the sitting cases.

Chart B shows that $31\frac{1}{2}$ wagons will convey 378 sitting cases; but there are 456 sitting cases, which leaves 78 sitting cases to be conveyed by civilian wagons.

Chart B, for 78 sitting cases, gives 9 civilian wagons on a G.S. wagon basis. As each wagon will make 2 journeys, $4\frac{1}{2}$ or say 5 civilian wagons will be required.

I am fully alive to the fact that I lay myself open to criticism as an amateur and that my charts are based on figures got from books; but these figures are official, and the work of men who have compiled them from actual experience. We have nothing else to go on; and while at first glance the tables may seem too mathematical in character to be used in dealing with such uncertain things as casualties, I hope I have made it clear that, given the actual numbers to be dealt with, the tables are still of use for the classification of casualties and for determining with rapidity and accuracy the amount of material and time required for their disposal.

While various formulæ have been suggested for the practical

application of the percentages, I would point out that before these formulæ can be applied percentages must be reduced to actual figures, all of which involve time and are liable to inaccuracies. Even after the figures have been accurately arrived at a formula such as the one officially given may still be in error, as shown by the following.

The first and second part of this formula $\left(M = \frac{W \times t}{T \times n}\right)$ $\left(T = \frac{W \times t}{M \times n}\right)$ is only true so long as T is a multiple of t, i.e., t goes an even number of times into T. Let M be the number of wagons, W the number of sitting or lying cases, T the total time available or required, t the time required to make one return journey, n the capacity of one wagon, and take a concrete example to show that the first part of the formula can give a wrong answer: Assume T is 6 hours, t is $2\frac{1}{4}$ hours, W is 480 sitting cases; n in this case would be 12. Find M the number of wagons required: $M = \frac{W \times t}{T \times n} = \frac{480 \times 2\frac{1}{4}}{6 \times 12} = 15$ wagons (Mark VI). To show that this answer is wrong, the total time allowed is 6 hours and the time of each return journey is $2\frac{1}{4}$ hours, so that the wagons will only do 2 return journeys in the given time; then 15 wagons (Mark VI) will in 2 return journeys convey only 360 sitting cases. But the problem was for 480 cases, which will still leave 120 cases to be dealt with; consequently the number of wagons should be 20 instead of 15. This shows a deficiency of 33 per cent of the number given by the formula.

Take a concrete example to show that the second part of the formula can show an inaccuracy: Assume M is 16 wagons (Mark VI), let W be 480 sitting cases, n be 12 in each wagon, t be two hours for return journey. Find T the time required to clear the field: $T = \frac{W \times t}{M \times n} = \frac{480 \times 2}{16 \times 12} = 5$ hours. Now as 16 wagons (Mark VI) will convey 384 sitting cases in 2 return journeys there remain 96 cases for a third journey which will be necessary, and in which case the total time will be 6 hours in place of 5 hours as the formula would show. This represents an error of 20 per cent of the number given by the formula.

The errors which may arise by the use of the official formulæ are clearly demonstrated by the foregoing examples. The charts on the other hand are mathematically correct, and as they approach the subject from all points of view the necessary results can be obtained from the most limited data and with a minimum of calculation.

REFLECTIONS ON THE ARMY MEDICAL SERVICE IN CAMPAIGN.

By Captain C. R. SYLVESTER BRADLEY.
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Introduction.

The importance of the medical branch of an army in the field is now fully recognized by all civilized nations, but although the medical objective of every nation's army medical service must be the same in principle, considerable differences are met with in their medical organization for an army in the field. There can be no doubt that our own army medical department has made great strides towards efficiency in the last few years; but can we critically examine our present field medical organization and pronounce it perfect? Our present scheme of medical organization is the result of lessons received in the South African War, when our army was operating a considerable distance from its base and often many miles from the railhead. Our next war is likely to take place under totally different conditions. It is more than probable that it will take place in a more civilized and densely populated country than South Africa. Mechanical transport has replaced horse transport; scouting is carried out by aircraft; and the range of both artillery and rifle fire has increased. Owing to these new conditions of warfare individual battles are likely to be more protracted, but the mobility of the fighting force has been greatly increased.

Is our present field medical organization able to contend with these new conditions of warfare? If we were asked to summarize the principles on which our present system of medical assistance in the field is based, as evidenced by the organization and equipment of the field medical units, our answer would be the collection and first aid of casualties by regimental medical establishments and the bearer divisions of field ambulances, and their further treatment at the dressing station before evacuation to the clearing hospitals; whilst, on the other hand, the system of medical assistance required in modern warfare in a civilized country would appear to be the collection and treatment of the sick and wounded by regimental medical establishments and the bearer divisions of field ambulances, and their further evacuation by the field ambulances.

In the critical remarks which follow there is no desire to disparage our present field medical organization, but rather to express

certain views that have arisen from a theoretical study of this interesting subject. The writer is fully aware of the little value that can be attached to any such destructive criticism which is not based on practical experience. In the military situations which are dealt with it is assumed that the action takes place in a civilized country, and in discussing such subjects as the collection and disposal of casualties, it is taken for granted that the engagement is or has been successful.

The functions of the medical service in the field may be considered under two heads: (1) The military objective; (2) the medical objective. The military objective is: (i) To keep all ranks in as perfect a state of physical efficiency as possible; (ii) to keep as many effective troops in the firing line as possible; (iii) to evacuate the non-effectives with all speed from the scene of active operations; and (iv) to keep up the *moral* of the fighting troops. The medical objective is: (i) To perform efficient "first aid" with the least possible delay; (ii) to relieve pain and suffering; and (iii) to remove serious casualties to permanent shelter with as little disturbance to the patient as circumstances permit.

An efficient medical organization must, however, combine the principles of both the military and medical objective, always remembering that matters medical must be submissive to military considerations.

Having axiomatically laid down the conditions by which the efficiency of a medical organization may be judged, let us theoretically test certain details of our own medical organization in the field.

The Regimental Medical Establishment.

If we calculate the war strength of a battalion of infantry at 30 officers and 1,022 other ranks, we may roughly estimate according to Cron's formula that the total casualties in any particular engagement will be 63; in round numbers, 12 killed, 6 slightly wounded, and 44 requiring hospital treatment.

The frontage over which a battalion normally operates during an attack may be reckoned at one to three men per yard, and three to five men per yard for the "decisive attack" (Field Service Regulations, Part I, Section 104). During the early phases of the attack when "the advance of the firing line must be characterized by the determination to press forward at all costs" (Field Service Regulations, Part I, Section 105), the troops will come under effective artillery fire at a distance of 2,500 to 4,000 yards and will continue

to press forward until they get within close rifle range at say 600 yards. This means that 63 casualties may be scattered over an area 500 to 600 yards wide and from 1½ to 2 miles deep, with 1 medical officer and 16 stretcher-bearers to perform first aid, get serious cases under shelter, and keep in touch with the fighting troops. Theoretically the task appears impossible if efficient first aid is to be carried out. If this is true, where does the fault lie, and is our medical organization to blame?

We stated just now that matters medical must always be submissive to military considerations; it is therefore out of the question hastily to propose an increase in the personnel of the regimental medical establishment, which would increase the number of non-combatants in the firing line. Can however more rapid and efficient first aid be carried out with the existing organization?

A possible solution appears to be the earlier co-operation of field ambulances and regimental medical establishments. Existing regulations state that it is the first duty of field ambulances to "establish touch by means of their bearer divisions with the regimental medical service of the units in the area assigned to them, and to obtain information regarding the places where wounded have been left under cover" (Field Service Regulations, Part II, Section 90). There is no doubt that the majority of officers commanding field ambulances will place a sufficiently broad interpretation on the regulations to meet most contingencies. On the other hand cases are likely to occur, especially if cover is deficient and the officer commanding the field ambulance has not been kept informed of the military situation, when the bearer divisions will remain with the ambulance until the engagement is over before any attempt is madeto get in touch with the regimental medical establishments. It is fully realized that in most engagements the collection of casualties will have to take place after the battle, and often by night, but at the same time there is nothing to prevent individual members of the bearer division, if they take advantage of cover, from advancing in the wake of the fighting troops and ascertaining the locality of regimental aid posts or other collections of wounded, and even rendering some service to cases which have escaped the attention of the regimental medical officer. This would greatly facilitate the collection of casualties by the field ambulance and hasten their evacuation. The point which it is wanted to emphasize is that definite scouting by the bearer divisions is necessary to locate the position of regimental aid posts and other wounded, and that

individual bearers unencumbered by stretchers may be able to afford valuable assistance to casualties which have escaped the regimental medical officer, before any method of removing them from the field can be considered.

THE EQUIPMENT OF THE REGIMENTAL MEDICAL ESTABLISHMENT.

Let us now consider the equipment available for "first aid" in regimental units; but before doing so, it will be well to define "first aid," or rather the principles upon which efficient "first aid" is to be based. Efficient first aid must be carried out as soon as possible after the receipt of the injury, and should include: (i) Some method of skin disinfection in all open wounds; (ii) an application to open wounds of sufficient absorbent material to prevent infection from the outside and to absorb all discharges: the dressing should not require renewing for at least twelve hours; (iii) some support to broken limbs; (iv) the relief of pain.

The question of some quick method of skin disinfection is one that ought to receive very serious consideration in the future first-aid treatment of the wounded. There are no means of carrying this out with the present regimental medical equipment, and I would suggest one of the various alcoholic solutions of iodine[1] as a possible and simple method for adoption.

To refer again to our casualties we remarked that sixty-three might roughly be estimated as the total casualties likely to occur in a battalion in any particular engagement. Fifty at least of these will require the application of some form of dressing. Each man of course carries with him his first field dressing, which would be more accurately styled an "emergency field dressing" as it is quite inadequate for the performance of "efficient first aid" in anything but the slightest of wounds. Roughly speaking, two ounces of wool and two three-inch bandages would not be an extravagant supply of dressings for each wounded man, some will require more, some less. Our fifty casualties will therefore require one hundred ounces of wool and one hundred three-inch bandages or their equivalent for the performance of "efficient first aid"; whilst the total amount of wool and bandages available in the surgical haversack, medical companion, and field medical panniers is only seventy-two ounces of wool and eighty-four bandages. These details may convey a false impression, but it at least appears evident that there is bound to be

[1] Iodine was introduced into our field medical equipment in December, 1912.—ED.

a shortage of bandages and wool, which could easily be obviated by providing every other or every third regimental stretcher-bearer with a waterproof satchel containing nothing but compressed wool and bandages, or different sized "first field dressings," which should not interfere with the mobility of the unit or necessitate any increase of transport. A minor point in connexion with these compressed dressings is the difficulty with which the paper covering is removed, especially if one's fingers are at all numb; a simple device for overcoming this is to have a piece of thread embodied in the wrapper which, when pulled, cuts through the paper.

In mentioning the relief of pain as being one of the principles of "first aid," I only want to allude to the question of the administration of morphia. There appears to be a divergence of opinion as to the cases which may or may not be given morphia. Personally I think that all cases, including penetrating wounds of the abdomen, should be given morphia if in any pain. I do not make this statement simply from a humane point of view, but because it appears to me that better results would be obtained by its administration, especially when cases have to lie out in the open for some hours without food. The only serious objection that can be advanced against its administration is the fact that it masks symptoms; but as the effects of the drug will have time to wear off before any special treatment in the way of operation can be thought of, this objection should not hold.

The act of administering morphia hypodermically would be much simplified if some easy method were adopted of carrying a hypodermic syringe ready for use. I have seen a belt designed with this point in view; a large-sized hypodermic syringe with needle fitted ready for use was contained in a cartridge-shaped receiver filled with an antiseptic solution. Morphia in a liquid form was supplied in capsules which fitted in separate compartments round the belt.

Before leaving the subject of the equipment of the regimental medical establishment, I would call attention to the pattern of stretcher supplied to regimental bearers. To perform their duties efficiently, stretcher-bearers should always keep in touch with the fighting troops; this necessitates their moving in "open order," and taking advantage of all available cover, an impossibility if the stretcher is carried. If the stretchers are left in the medical cart they will often be a long way behind when most needed. It therefore seems essential that all stretcher-bearers employed in the firing zone should be equipped with divided stretchers, each carry-

ing half on his back, the parts of the stretcher being identical and interchangeable. Any two bearers would thus be able to form a complete stretcher.

THE DIVISIONAL COLLECTING STATION.

The object of the divisional collecting station is to relieve the field medical units from collecting slightly wounded men; care must however, be taken to prevent trivial cases leaving the firing line. Apparently to guard against this contingency the reprint of Field Service Regulations, Part II, for 1913, does not now state that the regimental medical service should direct cases able to walk to the divisional collecting station, and it is therefore left to the personnel of the field ambulances to instruct the wounded on this point. Whether or no this change in the regulations is entirely satisfactory may be a matter for some divergence of opinion. If a slightly wounded case is to remain at a regimental aid post until the bearer division of the field ambulance comes along, the field ambulance medical officer still has the duty of examining this man and classifying his injuries, and at this period of the engagement the divisional collecting station may be farther off than a dressing station.

Whilst fully recognizing the objection to allowing any casualty to take himself off to the divisional collecting station on his own initiative, I think it would be better if the regulation was that *no case* was to be sent to this collecting station without a written order to that effect from a medical officer. The regimental medical officer would then in suitable cases mark a tally "D.C.S.," or give the man a specially coloured tally and start him off without delay.

The divisional collecting station is undoubtedly a very important formation, and if properly organized should considerably lessen the difficulties of collecting casualties. The number of slightly wounded that are likely to occur in a division in any engagement may be estimated as over one hundred, a number that is easily calculated to complicate the work of the bearer divisions of the field ambulances if a large proportion happens to occur in one brigade. Having got our hundred or more slightly wounded to the divisional collecting station, what are we going to do with them? Regulations state they should be "treated, fed, and rested before further evacuation or return to their units" (R.A.M.C. Training, para. 185), but no definite personnel is allotted for this duty, although it is stated that a field ambulance "may be ordered to

detail a tent subdivision or other detachment for duty at the collecting station" (*ibid.*).

What I would emphasize is that the personnel to feed, treat, and keep discipline (an important point) at the collecting station is required before the casualties arrive, and should not be left until the assistant director of medical services has been informed that a number of starving men are clamouring for food and attention, which must happen unless he details a definite personnel before the action starts. Preparations must also be made beforehand for feeding the slightly wounded, and for this purpose extra rations must be indented for, as in all probability they will not be forthcoming if left until casualties have occurred.

The Feeding of Casualties.

The feeding of casualties will always be a matter of some difficulty for the officer commanding a field ambulance to contend with. Fighting troops will generally move off to take up a position for an attack before daybreak, and if brought into action will probably remain for a considerable period without food, with the exception of the unexpended portion of the previous day's ration which each man carries with him. A casualty unable to walk will often have to remain on the field until nightfall, so that when he eventually reaches the dressing station he should certainly feel hungry! How does the field ambulance obtain the necessary supplies to feed him? The contents of the medical comfort panniers will not be of much use to feed a man not too ill to be hungry, whilst his daily ration will be with his battalion and certainly not procurable. Regulations on the subject state "extra rations and additional medical comforts will be obtained on indent in the usual way, or if permissible, by requisition from local resources, as many of the wounded arrive exhausted and in need of a meal" (R.A.M.C. Training, para. 201). The point, however, is, when should this indent for extra rations be made and for how many, to ensure sufficient food being available for casualties at the dressing station and divisional collecting station? It also seems probable that the establishment of cooks in the field ambulance will require some addition if casualties are to be fed with any dispatch, as the personnel of the R.A.M.C. will themselves require food after an engagement, and cooks will also be required for the divisional collecting station.

Sick Transport in the Field.

The transport of casualties from the field ambulance to the clearing hospital and from the clearing hospital to railhead has always been a difficult problem; but with the advent of mechanical transport and improved methods for supplying the troops with food and ammunition the difficulties have increased. The refilling points, where the supplies are transferred from mechanical transport to the supply trains, are situated when troops are moving at the heads of the areas from which the troops marched the same morning. It therefore follows that supply sections of the trains do not move back but are always advancing. "During battle it may be necessary to send back the trains some distance to refill from the supply columns" (Field Service Regulations, Part II, Section 51). After a victorious engagement a rapid advance is likely to follow, which means that the casualties ought to be at the refilling point in time to go back in the empty lorries the morning following the engagement. To do this the supply trains will certainly have to help the field ambulances. The regulations on the subject are very scanty, as follows: "After the trains are refilled, supply columns will, under orders from the inspector-general of communication, return to the railway line, being, however, if the commander-in-chief so decides, used for the evacuation of casualties and sick, who will be handed over to representatives of clearing hospitals sent forward with the supply columns for the purpose. Arrangements to this end will be made between the representatives of the quartermaster-general's branch of the staff and of the director of medical services" (Field Service Regulations, Part II, Section 52). Again: "The necessary transport for conveying the sick and wounded to the stationary hospitals or to the railway will be provided under arrangements made by the inspector-general of communications, co-ordinated, if necessary, by the quartermaster-general's branch of the staff at general headquarters. The empty wagons of supply columns and ammunition parks returning to replenish at the railhead may be utilized for this purpose, sufficient personnel from the clearing hospitals being sent forward with the supply columns, etc., to take over the sick and wounded" (Field Service Regulations, Part II, Section 91).

The difficulties of sick transport in the field are brought forward at nearly all staff tours, and must be fully recognized by the authorities; even the close co-operation of an efficient medical administration with a sympathetic quartermaster-general's branch

of the staff and inspector-general of communications cannot remove the serious disabilities with which arrangements for sick transport in the field have to contend. And, moreover, even if the difficulties mentioned are overcome, and the casualties are got to the refilling point, there exists no apparatus for rapidly fitting up motor-lorries for the conveyance of the seriously wounded. Theoretically the only method of obtaining efficient and rapid transport of casualties from field units is to be found in a specially organized sick transport column which should include a good proportion of motor ambulance wagons. The advantages or disadvantages of such an addition to the present medical organization should not be considered solely from the point of view of the medical service, as the more rapid evacuation of the sick and wounded should materially lessen the burden of transport by diminishing the amount of food and medical comforts required for ineffectives in the field.

The Administration of Field Medical Units.

No matter what degree of individual efficiency is attained by medical units in the field it can be of very little value without efficient administrative control, whilst efficient administration is itself dependent on the effective intercommunication of field medical units and the administrative staff. The assistant director of medical services of a division is most suitably placed for obtaining information as to the number of casualties likely to occur, or to be occurring, in any particular locality; but has he adequate means of communicating his instruction to medical units, and have medical units any facilities for communicating with the assistant director?

Divisional headquarters will certainly be in close touch with brigade headquarters by means of the divisional signal company, and there is no doubt that the assistant director of medical services will be able to communicate with officers commanding field ambulances by means of cyclists, etc., in the early stages of the engagement. But whenever an officer commanding a field ambulance is told to act on his own initiative, which must frequently be the case, he loses touch with his assistant director and must seek all information with regard to the engagement from the brigade headquarters. The field ambulance has no "long distance" signallers, and the semaphore signallers will be employed in connecting up the several parts of the unit; any message, therefore, must be "hand carried" from brigade headquarters to the officer commanding the ambulance, which must certainly entail much

delay in delivery. As a result of this, it appears probable that field ambulances will often have to act as brigade units without the advantage of having any brigade administration. Theoretically it appears necessary for an officer belonging to the field ambulance to be located at brigade headquarters whenever an ambulance has to be attached to a brigade, and that he should be in touch with the officer commanding the ambulance, either by signallers or by mounted orderlies.

Conclusion.

As previously remarked the writer is well aware of the small value that can be attached to the theoretical criticism of a subject which is essentially practical. The following points, however, may merit further consideration :—

(1) That modern warfare will require more elaborate "first aid" in the field and more rapid evacuation of casualties.

(2) That the "first field dressing" is inadequate for efficient first aid, and additional dressings are required in the field.

(3) That the earlier co-operation of field ambulances and regimental medical establishments is desirable.

(4) That bearers in the field require divided stretchers.

(5) That the medical and surgical equipment of the field ambulance is more than sufficient for the duties required of it, for example, in such articles as operating tables, tents, etc.

(6) That definite instructions are required as to the method of feeding casualties by field ambulances.

(7) That a brigade administration is necessary for field ambulances attached to brigades.

(8) That mechanical sick transport is required between field ambulances and clearing hospitals.

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THE COLLECTION AND EVACUATION OF SICK AND WOUNDED IN THE TERRITORIAL FORCE.

By Captain H. H. A. EMERSON.
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Apart from the prevention of disease, the main function of the medical services is the speedy evacuation of the sick and wounded from the fighting units to general or temporary hospitals. This is necessary not only for the sake of the wounded, but also to free the fighting troops from the encumbrance caused by large numbers of non-effective men. The expression "general or temporary hospitals" is used advisedly to indicate that although the majority of the wounded will be evacuated down the lines of communication, yet there are two classes which will require temporary accommodation up near the front, namely, those that are too seriously injured to be moved, and those that are so slightly wounded as to require only a short time under medical care before rejoining their units. The care of the sick and wounded during evacuation and the provision of medical and surgical equipment are also functions of the medical service, but they are so inseparably bound up with the question of evacuation as to justify their being included with it. No system of evacuation can be considered adequate which does not also provide for the care of the wounded, and for a sufficient supply of medical and surgical equipment.

The object of the present article is to endeavour to lay down the rôle played by each of the medical units of the Territorial Force, and to describe how they may be best employed in the various situations that are likely to arise, not only in action, but also on the line of march, and during periods of inactivity. Though primarily written for territorial officers, it is thought that it may be of interest to the readers of this Journal.

Before proceeding further it will be necessary to get a clear idea of the functions of field ambulances and clearing hospitals. In addition to their normal function of the collection of wounded and the formation of dressing stations, field ambulances will have to establish divisional collecting stations as laid down in R.A.M.C. Training, para. 185; but there is a third function, and that is the leaving behind of one or more of the tent sub-divisions to care for wounded not yet evacuated to the clearing hospital, in other words the formation of field hospitals. This function is indicated

in para. 209, R.A.M.C. Training, and was also laid down by Surgeon-General W. G. Macpherson in an article published in the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS about eighteen months ago. Further, field hospitals as distinct units are provided for in the organization of the medical services of practically every other army, and there is no doubt that our tent sub-divisions are intended to be used as such in suitable cases.

In the report on the medical arrangements of the South African War, page 92, the committee recommended the adoption of the combined unit system, "not, of course, to the exclusion of field hospitals for divisional use," and further on, page 100, "Field hospitals continue and complete the work of the ambulance and enable the latter to advance or retire without hindrance." Tent sub-divisions which have thus become stationary must of necessity lose touch with the commanding officer, and their administration and control by the assistant director of medical services is rendered difficult. Would it not be better therefore to remove them from the field ambulances altogether and organize them into separate units directly under the control of the assistant director?

The addition of extra stretchers and blankets to the equipment of these units would add materially to their efficiency.

The clearing hospital of the Territorial Force is a small unit consisting of three officers and five other ranks, and is comparable to the sick and wounded transport department of the Japanese Army. Its function in peace time is to assist in the training of the voluntary aid detachments, and on mobilization to take charge of and superintend their work in connexion with the care and evacuation of wounded. At first sight it would appear a very simple matter to organize an efficient clearing hospital by filling up this skeleton unit with voluntary aid detachments, but two difficulties stand in the way: firstly, the lack of a medical officer in the establishment of a women's detachment, and secondly, voluntary aid detachments can only be called upon to serve in their own area. This limitation of the sphere of work of voluntary aid detachments renders it probable that the clearing hospital will not be working in war with the same personnel it has trained in peace, and further that it will probably be working with different personnel from day to day. It is therefore very necessary that the system of training and organization should be the same in every division.

The functions of a clearing hospital are to form:—

(1) Rest stations where convoys of sick and wounded will halt for rest and refreshment, and, if necessary, accommodation over-

night. The establishment required is one medical officer and personnel for nursing and cooking, say about half a men's, or one women's detachment.

(2) Temporary hospitals for the care of those cases that are unfit for further transport, and of those that are so slightly wounded as to be able to rejoin their units after a week or two. One women's detachment, and one or two medical officers should be a sufficient personnel for these hospitals.

(3) The clearing hospital proper to take over the wounded from field ambulances and transfer them to railhead or the temporary hospitals prepared for their accommodation. The clearing hospital would usually be situated on a railway, but should not be more than ten or twelve miles from the fighting line; if there is no railway within that distance, the clearing hospital should be opened in some suitable buildings, and an entraining station opened on the line where the ambulance trains are to be loaded.

The following organization is suggested for a clearing hospital: (*a*) A receiving department where the wounded would be classified into slightly wounded, fit for transport, and unfit for further transport. The employment of clerks is necessary, as a record must be kept of the disposal of each case, particularly of those that are to be sent to the temporary hospitals. The personnel, therefore, should consist of one medical officer, two clerks from the permanent personnel, and an unloading party from the voluntary aid detachment. (*b*) Wards prepared for the wounded and staffed by two medical officers and nurses. (*c*) A discharge department staffed by one medical officer and a men's detachment. If the unit was situated on a railway this department would also carry out entraining duties. (*d*) The steward's store under the quartermaster of the unit. (*e*) The pack-store in charge of one of the permanent personnel, assisted by some of the voluntary aid detachment. (*f*) The kitchen. Sanitary and water-duty men may also be required, but as the hospital will always be in buildings, a good water supply will, as a rule, be available, and probably sanitary conveniences also.

The additional personnel required under the above scheme would consist of two medical officers, one men's and one women's detachment.

(4) The collection and preparation of country carts for the transport of the wounded from the field to the railway. The employment of motor transport for this purpose would be a distinct advantage, owing to its greater speed and comfort. For sitting

cases private motor-cars would be useful, but the best type for all purposes would be motor-omnibuses or vans. Large numbers of the latter type, built to carry from fifteen to twenty hundredweight, are employed in all the large towns, and could easily be adapted for ambulance use. Were the British Red Cross Society to take this matter up and raise new detachments, called Red Cross motor detachments, and register these vehicles in peace, it is certain they would be able to raise units that would be invaluable in war. These convoys would be employed not only to carry wounded to railhead, but also in suitable cases to evacuate direct to general hospitals. The advantage of the latter method, especially for serious cases, is obvious, as the wounded are brought direct to hospital with only one move, and the discomforts of entraining and detraining are avoided.

(5) Improvisation of ambulance trains. The medical and surgical equipment required could probably be obtained locally, but if not, there would, it is presumed, be depots of these stores formed on the line of communication. To carry out this scheme the officer commanding a clearing hospital would have to be granted requisitioning powers, and also be authorized to employ civilian medical practitioners; but in connexion with this point, as it is probable that two or more divisions would be grouped together into one army, one clearing hospital might be sufficient for both, and by using the permanent personnel of two clearing hospitals the aid of civilian medical men could be dispensed with.

During Periods of Inactivity.

The assistant director of medical services will establish a daily service of ambulance wagons to collect the sick of all the units and bring them into the field ambulance detailed to receive them. These arrangements will be published in divisional orders, and will include a time-table of the service of wagons. The tent subdivision detailed to receive the sick should be preferably one of those earmarked as a field hospital, thus leaving the first line of medical units (i.e., bearer division and dressing station) free to advance with the troops at short notice. The regimental medical officer has to decide which cases should be sent back and which retained. He is influenced on the one hand by the desire to keep the fighting line of his unit as full as possible, and on the other by the fear of receiving a sudden order to advance when he has some sick on his hands. Further, officers commanding field ambulances will

not be over-pleased if, after receiving an order to march, there is a large influx of sick from the various units. It is impossible to lay down any rule, but the principle to be observed is, if there is any probability of a move, evacuate all, but if the unit is likely to remain in quarters for a few days doubtful cases may be kept for forty-eight hours.

The final disposal of these cases will rest with the clearing hospital; serious cases will be sent down the line to a general hospital, for which purpose a specially equipped coach might be attached to the supply trains. If the railhead is some distance away a rest station may be required, and the sick will be transported in the supply wagons returning empty. Slight cases will be kept in the field units if the military situation permits, otherwise they will be cared for in a temporary hospital staffed by a voluntary aid detachment. The best method would probably be to establish the field unit in buildings and to warn a voluntary aid detachment to be ready to take over the hospital at short notice.

On the Line of March.

The medical arrangements on the line of march are very similar to those adopted during periods of inactivity. The assistant director of medical services will detail one field unit to receive the sick on arrival in camp; the service of ambulance wagons would not be established, and units would be responsible for sending in their own sick. The distances, especially if the troops are billeted in depth, may be so considerable that hand carriage will be out of the question; therefore carts will have to be requisitioned and prepared for the purpose. If none are available the sick must be left in charge of the inhabitants and picked up next day by the advancing field ambulances; but this is to be avoided at all costs, as it means so much extra travelling for the sick before they reach a hospital.

The cases must arrive at the tent sub-division opened to receive them in time for classification and treatment preparatory to further evacuation. This hour must be notified in divisional orders and will depend on the time of marching, or the time that the supply wagons start on their return journey, if that method of evacuation is to be used. As an alternative it is suggested that the country carts, requisitioned by the units, carry the sick on to railhead, or, if the distance is not great, the ambulance wagons could be detached and ordered to follow up and rejoin their unit during the day.

The principle of distributing ambulance wagons throughout the column to take up those men that fall out on the march is a very good one, as many of these cases if given a lift at the time will be quite well again next day. It can, of course, only be adopted if the military situation permits and by order of the commander. Failing this, men falling out may be able to march if relieved of their arms and kit, or they may be carried for a time on the first line transport. If too ill for this they must be left on the roadside or in charge of the inhabitants to be picked up by the field ambulances. From the field ambulances sick will be evacuated daily, by means of the empty supply wagons or by one of the other methods alluded to above, to railhead, where the clearing hospital will have established a rest station to look after them pending their further evacuation down the line; trivial cases may, however, be kept in the field units provided no engagement is imminent.

In the Austrian organization provision is made for the establishment of "collecting stations," not only during periods of inactivity but also every three days or so on the line of advance, the personnel being furnished by a unit called a mobile reserve hospital, supplemented by civilian aid as much as possible. The equipment is drawn almost entirely from local resources. The function of these stations is threefold: (1) To treat those cases that are likely to recover soon, and send them forward to rejoin their units; (2) to retain and treat the more serious cases until they are fit for transport; (3) to evacuate those cases that require prolonged hospital treatment, but are fit for transport, and to provide rest and refreshment for such cases passing down the line. In other words, they perform the functions of clearing hospitals on a small scale. These stations are only formed when the sick have to be evacuated by road. Similar stations might with advantage be used in the territorial organization to undertake the care of trivial cases, even when the evacuation is carried out by rail. They could be staffed by a women's detachment, and their formation would keep the field units empty and lessen unnecessary evacuation; the patients when recovered could be sent forward with the supply columns to rejoin their units.

On the Eve of an Engagement.

The wounded that first arrive from a battle consist of: (1) those who are so slightly wounded that it is advisable to retain them near the front, and (2) those who though seriously wounded are yet fit for transport. The former should be kept at the head

of the line of evacuation until it is seen what the issue of the battle is likely to be, so that in the event of a retirement they can be removed out of danger of capture; the latter should be evacuated at once. With this object in view the officer commanding the clearing hospital under the orders of the director of medical services will prepare to open his unit on the morning of the battle.

The type of action, i.e., defence, attack, or encounter battle, will, of course, influence the medical dispositions, so it is proposed to deal first with an attack and later indicate how the arrangements would differ in the other cases.

The director of medical services of the army will draft a plan of evacuation for the approval of his commander; this will include the sites of the clearing hospitals, the collection of auxiliary transport, and the places where it is to be assembled, the site of rest stations if such are necessary, the roads to be used by the convoys, the stations where the wounded are to be entrained, and the number of trains that are to be prepared. Probably the best distance from the firing line for the clearing hospital is about ten miles, and if there is a railway available within that distance the hospital should be situated on it. Otherwise a suitable situation will be chosen within that radius and the sick evacuated thence to the nearest railway, where a detachment will be posted to entrain them, with rest stations along the route if necessary. The possibility of having to evacuate the wounded by road must be considered, and here the motor convoys already referred to would be very useful. Based on this plan the director will draft paragraphs for insertion in operation orders for the information of the commanders and assistant directors of medical services of divisions; and he will also issue orders for the officers commanding clearing hospitals and indicate if necessary what personnel they are to use. Thus, if two divisions are acting together, but with separate lines of evacuation, two clearing hospitals might be established, and it would be advisable to allot certain voluntary aid detachments to each. At any rate, it will probably be his duty to call up the voluntary aid detachments, and he would order them to report to officers commanding clearing hospitals at definite hours and places. The collection of transport and its preparation should be done by the detachment before they report themselves. In this way a larger area would be drawn on both for transport and material for its preparation. Having been collected, the officer commanding a clearing hospital would merely have to send the transport under a competent guide to the place selected

for its assembly. The duty of collecting medical and surgical material will devolve on the personnel of the clearing hospital; the best method would probably be to requisition some carts and go round and collect it; this should be done as early as possible, so that any deficiencies might be wired for in time to be sent up on the first ambulance train. Then having collected personnel, transport, and equipment the officer commanding will proceed to establish his clearing hospital in the manner already suggested.

The assistant director of medical services, on receipt of the information that an engagement is imminent, will clear his units of any sick they may contain. He will then select a site for the divisional collecting station in accordance with para. 185, R.A.M.C. Training. The early opening of this station is of importance, as it is the first link in the chain of evacuation during the preliminary stages of the battle, and if not opened, the wounded who first come out of the firing line, i.e., walking cases, will wander back in all directions towards the rear instead of being collected in one place. The next point to be considered is the dispositions of the field ambulances, and here a point of unorthodoxy creeps in. Instead of allotting the field ambulances to areas, it is suggested that a rendezvous be appointed, where the units would assemble and await final orders, then when the action had developed the assistant director would be in a position to decide on the most advantageous dispositions, with definite knowledge to act on. It may be said that this would keep the medical units back too long, but on reading accounts of battles one is forced to the conclusion that, until a lull occurs, or the action moves on, very little can be done beyond attending to the slightly wounded who make their way out of the firing line, and here the value of the divisional collecting station is apparent. At the same time the assistant director, accompanied by the officers commanding ambulances, should make a reconnaissance of the ground to select alternative sites for dressing stations, and draw up a general outline of the scheme. If a reconnaissance is not possible sites should be selected from the study of the map. Another argument in favour of holding back the medical units as long as possible is that it lessens the danger of their betraying the movements of the fighting troops.

In making arrangements for feeding the wounded the difficulty will be to have the food coming up for the combatant units diverted to the medical units. Two methods are suggested: one is to get out a rough estimate of the number of wounded per unit, and ask the

staff to send it to the officer commanding the supply column in time to divert the rations; the other, probably the more preferable, is to divert, as a routine measure, five per cent of the rations intended for the troops that are actually engaged. A message to this effect could easily be sent to the supply column in time to be effective. As regards distribution, it is estimated that in the most favourable circumstances not more than fifty per cent of the wounded will have reached the clearing hospital by the evening, therefore half the rations should be sent to that unit and half to the field ambulances. The officer commanding the former unit should further have instructions to send forward any rations he receives in excess of his requirements.

During an Action.

The duties of the regimental personnel are to render first aid, to collect wounded into groups where possible, and to direct cases able to walk to the divisional collecting station. The medical officer, accompanied by his lance-corporal, will go into the firing line; his presence there is necessary if only for its effect on the *moral* of the troops. Regulations state that the lance-corporal is to carry the field medical companion, but it is questionable if such an article of equipment is required. It weighs about thirteen pounds and contains material which is rarely needed in the field. Would it not be better if he carried a surgical haversack or even a simpler form of haversack containing nothing but supplies of dressing material?

The regimental stretcher-bearers should deploy with their companies and act as dressers during the fighting; it would be a great advantage if each pair carried a supply of dressings, and each man a water-bottle. During lulls in the fighting, or when the nature of the ground allows it, efforts should be made to collect wounded into groups. The stretcher-bearers should endeavour to keep in touch with the bearers on each side, and through them with the medical officer. Should they carry the stretchers or not? Undoubtedly, if they leave them behind they will be less hampered in their movements, and probably better able to attend to the wounded; but, on the other hand, they will not be able to avail themselves of the many opportunities that will occur for the collection of the wounded, and at the end of the day may be left without stretchers for a long time. The medical equipment cart ought to be brought up as close as possible, with orders to the man in charge to follow the battalion when the latter advances; some reserve of

water should also be brought up close to the front, so that if opportunity arises the stretcher-bearers can refill their bottles. It might be possible, with the concurrence of the commanding officer, to have a water-cart up with the medical equipment cart.

The attachment of tallies to every man in the field appears to be a waste of time; would it not be sufficient only to put them on the more serious cases such as hæmorrhage, abdominal wounds, etc.? For this purpose special tallies might be issued on which no writing was required, the presence of the tally in itself being sufficient to draw attention to the case and indicate that it was serious, the real tally then being attached at the dressing station.

Lastly comes the question of aid posts. As will be seen from the foregoing all the personnel, except the driver of the cart and the men of the R.A.M.C. for water duty, are in the firing line, so that it is difficult to see how personnel is to be provided for these posts. The medical officer, however, should select positions and point them out to the bearers, beforehand if possible, as the places where the wounded are to be collected if opportunity occurs, while if the advance is checked, or long intervals occur in the fighting, he would establish an aid post and work there till the unit moves on again.

The first duty of the field ambulance is to establish the divisional collecting station; the tent sub-division detailed for this purpose will therefore march direct to the site selected by the assistant director of medical services. This post will be organized in the following departments: (1) Receiving and recording departments staffed by one officer and the clerks. (2) A place for dressing where the senior officer will work assisted by the dispenser and two nursing orderlies. (3) Wards in two sections in charge of the wardmaster (senior non-commissioned officer) and the remaining five nursing orderlies. (4) Steward's store, where the steward will be assisted by the pack-storekeeper, the latter not being required. (5) Kitchen and water-duty men. (6) Sanitary area. (7) Transport park.

At this station the wounded will be classified into (*a*) those requiring transport, (*b*) those able to walk; the latter will be collected into batches and marched to the clearing hospital under the senior amongst them, and the former will be sent back in the improvised transport. Tallies will be attached to all cases that come in without them, and the best place to make them out is the dressing tent, at the dictation of the medical officer who is dressing

the case. But this would mean the employment of an extra clerk or an extra nursing orderly for the purpose. The latter could easily be spared for this duty as the wounded would not require very much attention. The present tally is too small, and the one described by Captain F. W. Cotton in the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS for March, 1912, would be much more useful.

The commanding officers having marched their ambulances to the appointed rendezvous will report in person, each accompanied by a second officer, to their assistant director. On receipt of final orders a commanding officer will send the second officer to lead the unit to the area selected, and go direct himself to select a site for the dressing station, if this has not already been done by the assistant director. If buildings are selected as a site for the dressing station they should be large and easily accessible to stretchers; such places as schools, barns, and large out-buildings suit very well, but small rooms are not advisable owing to the difficulty of looking after cases in them. The risk of tetanus infection in dressing cases of open wounds in the vicinity of stables, etc., has to be considered, and it would be interesting to have an authoritative opinion as to whether there is any real danger to be apprehended from this source.

On arrival of the unit the bearers will be disengaged and sent forward under their officers, and accompanied by the wagons as far as is consistent with safety. The commanding officer will indicate how he requires the dressing station to be laid out, and then ride on after the bearers, select the site where the wagons are to be halted, and see that the bearer sub-divisions engaged know exactly what areas they have to cover. He will then return and take up his duties at the dressing station. The organization of this post and the distribution of its personnel is similar to that of a divisional collecting station with the following exceptions: (1) There are two places set apart for dressing, one for slight and one for severe cases; the latter will be staffed by one officer, a dispenser, and two nursing orderlies, the former by the junior officer assisted by one orderly. This officer will also be in charge of the receiving department, and in addition will have to assist in the serious case department when anæsthetics are required. It is obvious that this multiplicity of duties will seriously interfere with the efficient working of the system. The obvious solution is the addition of an extra officer to the establishment; failing this, the system adopted in the Austrian organization of reinforcing the

dressing station with officers from the field hospitals might be adopted. (2) Wards will be organized into four sections, for walking, sitting, and lying cases, and for officers respectively. (3) A pack-store will be required. (4) Places will also have to be set apart for the dying and for the dead.

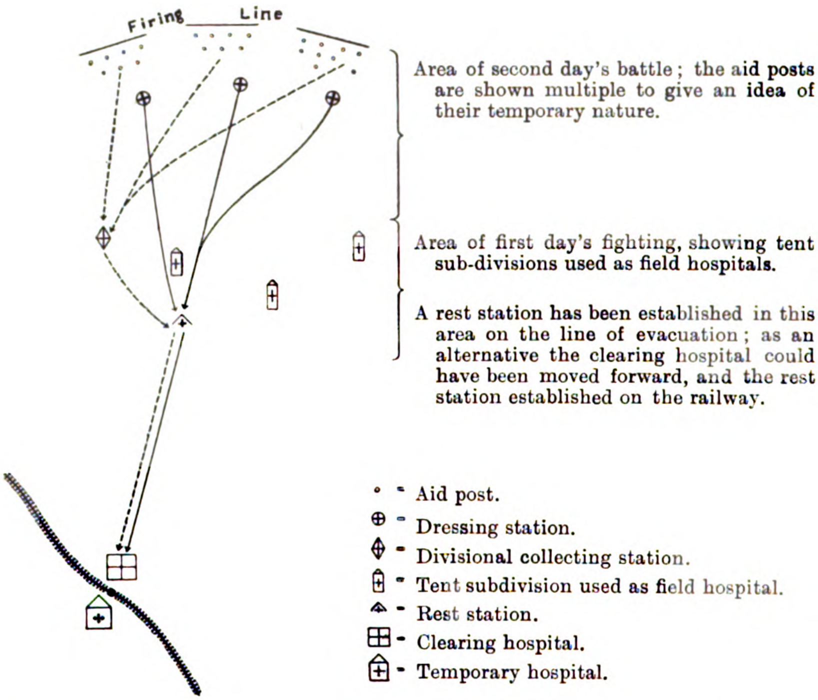


Diagram of Disposition of Medical Units on the second day of a battle. The route of evacuation of slightly wounded is shown in broken line.

The unloading of wagons and the carrying about of patients within the dressing station causes a good deal of confusion, owing to the fact that there is no one to do it except the nursing orderlies, who are as a rule fully occupied with their own duties. It is suggested that men might be withdrawn from the bearer sub-division for this purpose by reducing to five the number of bearers in six of the squads. The filling in of tallies at the dressing station can be done by the orderlies employed in the dressing departments, but the addition to the personnel of two men for this purpose would be of very great advantage.

The formation of an advanced dressing station will only be required when for any reason it is impossible to get the wounded back to the dressing station, or the dressing station up to the wounded. It corresponds to the old collecting station of the bearer company. Thus at the battle of Modder River, when owing to the Boer fire and the flat nature of the ground it was impossible to get wounded back, a collecting station was formed by the bearer company of the Guards' Brigade right up behind the firing line. An advanced dressing station consists principally of personnel and as much material as can be got up, the essential things being water, restoratives, and dressings.

The wounded when treated and fed at the dressing station will be evacuated to the clearing hospital, either on foot or by improvised transport. On arrival at the latter station they will be classified and dealt with as follows: (1) Those unfit for further transport will be handed over to a temporary hospital. (2) Those who require prolonged treatment and are fit for transport will be evacuated. (3) Those who will be able to return to their units after a week or two will be retained. If the result of the action is favourable they will pass to a temporary hospital; if not, they will be evacuated to a place of safety on the line of communication.

In the case of the action ending unfavourably the assistant director of medical services will be warned beforehand that the troops will probably have to retire; he will then accelerate the evacuation by every means in his power; the staff will be asked for all available wagons. All cases that can possibly march will be sent away, and there will be no delay for rest or refreshment at the field stations. The latter will not be closed till the assistant director receives orders to do so; finally, when the order to retire does come, if some wounded remain he must ask the commander for permission to leave personnel behind.

Should the troops be victorious the object is to collect the wounded as rapidly as possible, and to bring up the field hospitals to take over the cases at the dressing stations, thus setting the latter free to proceed with the troops. If there is a pursuit one field ambulance will be sent with the pursuing troops; but should the enemy merely retire to another position a short distance in rear, then probably our troops will hold the position gained, and all the medical personnel can concentrate their efforts on the collection of the wounded. As many field hospitals as are required will be opened, and the dressing station will be packed up ready to advance.

In defensive operations the medical arrangements are similar to those for an attack; they only differ in the more deliberate manner in which they are made, and the proximity of the positions to the firing line. The divisional collecting station and clearing hospital may be further forward and more permanent in character. The dispositions of the field ambulances can be gone into much more fully, and alternative schemes prepared for possible or probable contingencies; but, as in attack, it is suggested that they be held back till the enemy's intention is revealed. Owing to the stationary nature of the fight, and the probable presence of cover, the regimental personnel will be enabled to form aid posts, and these should be reinforced by personnel from the field ambulances (para. 211, R.A.M.C. Training). These temporary dressing stations, which constitute the only fundamental difference between arrangements for attack and defence, can be withdrawn when the field ambulances come into operation.

In an encounter battle the regimental personnel will act as in attack, i.e., follow up if the troops advance, rendering first aid and collecting wounded into groups; while should the troops act on the defensive, they will endeavour to form aid posts. The field ambulances may have to act on their own initiative, but the assistant director of medical services should endeavour to give them a rendezvous and deal with situations as they arise. He should establish the divisional collecting station as soon as possible and inform the troops of its position by means of messages sent to the brigade commanders. If acting independently, officers commanding field ambulances will endeavour to get into touch with the regimental personnel by means of the bearers. Dressing stations should not be pitched until the action has developed, and altogether their policy should be to remain in the background until they are required.

No remarks on field medical organization can be considered complete without a reference to aviation; and here, owing to my thorough ignorance of the subject, I must tread warily. It would appear, however, that in two directions at least aviation is already able to render great assistance in the treatment of the wounded: the first is the sending of medical aid to detached parties, e.g., cavalry raids; and secondly, the possibility of saving valuable lives, by bringing wounded quickly and easily within the reach of efficient treatment.

Clinical and other Notes.

NOTES ON THE MIGRATION OF *ASCARIS LUMBRICOIDES*.

By Lieutenant W. F. CHRISTIE.
Royal Army Medical Corps.

The occurrence of *Ascaris lumbricoides* in the human intestines has been common knowledge for centuries; Plinius named it *Tinea rotunda*. The parasite resembles the ordinary earth worm in appearance, having a long cylindrical body about five to ten inches in length, with tapering ends. It occupies as a rule the upper and middle part of the small intestine.

Cases seldom show more than half a dozen round worms at a time, but since one worm produces forty-two grammes of eggs annually, one may wonder perhaps at this scarcity. I have met with as many as seventy-two worms in one small intestine. One boy vomited two and passed twenty-four *per rectum* in three weeks. (Still.) If their numbers are considerable signs of toxic poisoning occur, often with curious reflex symptoms of nervous origin. Sigaud recorded a remarkable case of "a child, aged 6, who whilst eating his supper became unconscious, the right arm and leg were paralysed, and when after the return of consciousness santonin had been administered, twenty round worms were passed—with the result that the paralysis and the impairment of speech which had accompanied it passed off in a few days." (*Gaz. des Hopitaux*, June 30, 1904.) The great danger is the wandering of the parasite, fortunately not of common occurrence.

I have been able to collect the records of some eight hundred post-mortem examinations in which the worm was present in the intestines, and in only ten cases have they shown instances of migration, namely, one to the lung, one to the peritoneal cavity, one to the stomach, and seven to the liver. (Post-mortem records, Straits Medical Service, Singapore.) But cases are on record where the worm had found its way into the appendix, giving rise to an acute attack of appendicitis; into the duct of Wirsung, causing acute pancreatitis; up the pharynx and down the trachea with ensuing suffocation; and one case in which the worm passed up the Eustachian tube and gave rise to middle ear disease.

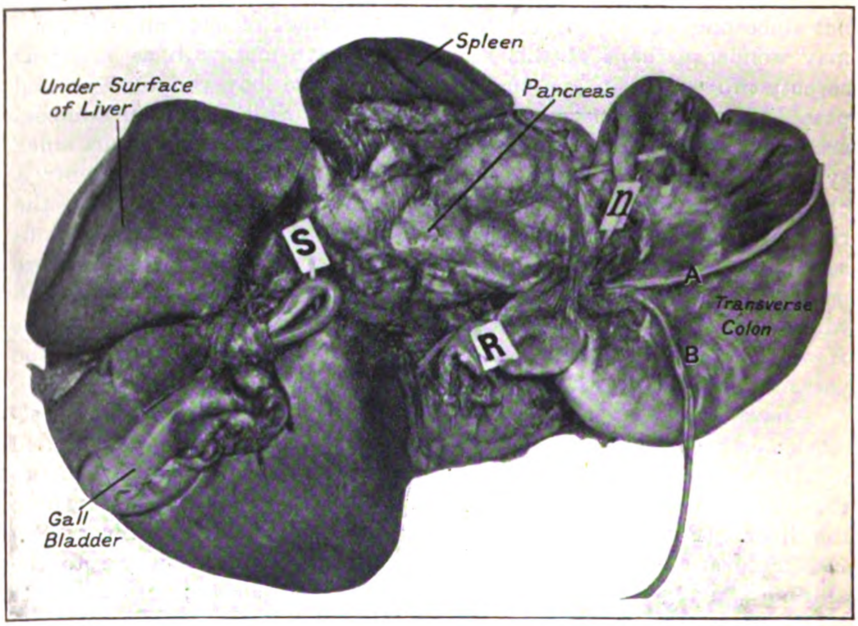
It is difficult to understand the reasons which lead them to start out on these pilgrimages—doubtless to better their position in much the same way as when they migrate from the human body before the death of their host. One must of course distinguish between post-mortem and ante-mortem wanderings; living round worms were found in the bile-ducts of two of the seven post-mortem cases mentioned above where migration

to the liver had occurred; in them there was no pathological change in the liver tissue.

The following cases demonstrate the remarkable power of migration possessed by lumbricoid worms :—

Case I.—A Chinaman, aged 36, a rickshaw puller, died from peritonitis during a severe attack of enteric fever. A perforation was found in a Peyer's patch about six inches above the ileo-cæcal valve, and about eight ounces of a turbid yellowish purulent fluid were found in the peritoneal cavity. Lying free in this pus was a dead round worm four inches long, while four more were present in the intestine. Had the worm pierced its way through a diseased portion of gut, or had it passed through an existing perforation caused by the typhoid ulcer?

PLATE 1.



Photograph by Corporal Baiden, R.A.M.C.

Case II.—S, round worm in common bile duct turned on itself. R, open end of colon, showing end of a round worm. N, two round worms having penetrated the mesentery, A being three inches long, B four inches.

Case II.—A Chinese child, aged 2, had vomited round worms on two occasions, and had passed many more in her stools. After death her abdomen was opened and a condition of general septic peritonitis was discovered. Some twelve worms were present in the peritoneal cavity,

round each of which the peritonitis was more pronounced. One had formed a localized abscess in the region of the spleen, and three had penetrated the layers of the mesentery and had become partially embedded in it (Plate 1, N, A and B). Careful search was made along the whole length of the bowel for an opening, but no perforation could be found. Some fifty-five worms occupied the small intestine, and one, turned on itself, had completely blocked the common bile duct (Plate 1, S). The liver was the seat of suppurative cholangitis with numerous small abscesses throughout its substance, in one of which two parasites were found coiled up. The general appearance of the peritonitis suggested the probability of infection from the worms themselves, and since they had demonstrated their power of penetrating the mesentery, why should they not have a similar power of penetrating healthy gut? But there was no visible perforation. How did the parasite arrive in the peritoneal cavity?

Case III.—A Tamil, aged 22, died from acute nephritis with marked effusions into the subcutaneous tissues, peritoneum, pericardium, and pleura. Both lungs were in an œdematous condition, and one round worm was found in the left lung—presumably having wandered thither by stomach and œsophagus, trachea, and bronchi. (The commonest route is from the small intestine to the liver through the bile-ducts.)

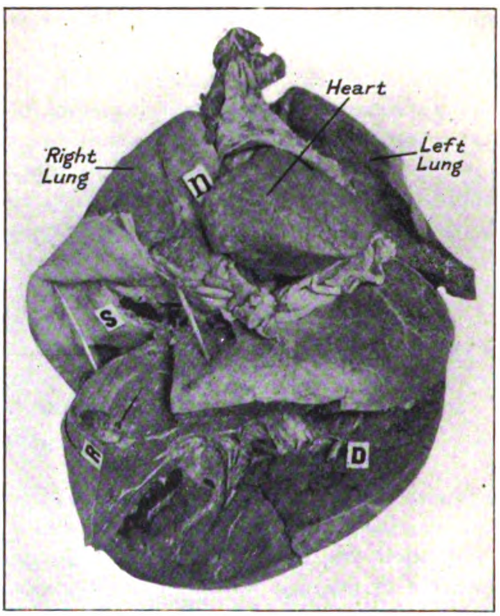
Case IV.—A Chinaman, aged 26, while in hospital suffering from acute bacillary dysentery committed suicide by hanging himself. Two macerated round worms were found in the smaller branches of the hepatic ducts, causing multiple septic abscesses in the liver radicles beyond. I had often wondered how far this liver condition would have spread, had he decided to remain in this world just a little longer. I found my answer in the following case which presented itself to me in February last.

Case V.—A Chinese child, aged 6, was admitted to hospital suffering from diarrhœa and vomiting, of which she died ten days later. At the post-mortem examination we found her small intestine occupied by sixty-six round worms of average size. Both ducts and the common bile-duct contained a round worm, and some three or four smaller worms were seen lying in the smaller branches of the bile ducts (Plate 2, D). Both right and left lobes of the liver were the seat of a suppurative cholangitis, with one large and several small bile-stained abscesses. Two of these, on the upper surface of the right lobe, had given rise to a large subphrenic abscess; this had ruptured through the diaphragm in two places (Plate 2, S), causing two abscesses in the lower lobe of the right lung. The larger of these ruptured into the pericardium (Plate 2, N), the smaller into the pleura, giving rise to a purulent pericarditis and a pyo-pneumo-thorax. Leading into the main abscess in the right lobe of the liver was the pointed end of an *Ascaris lumbricoides*.

Clinical Significance.

In patients known to harbour such parasites the possibility of migration should always be borne in mind. Thus the presence of ova or worms in the fæces associated with the onset of severe gastritis has occasionally ended in the vomiting of a round worm which had entered the stomach; similarly the occurrence of jaundice along with ova in the stools might suggest the possibility of a round worm in the bile duct. An increase of eosinophils in the blood is a suggestive point in diagnosis, but clinically there are no pathognomonic symptoms or signs, and diagnosis must depend on the appearance of the worm or its ova in the fæces.

PLATE 2.



Photograph by Corporal Baiden, R.A.M.C.

Case V.—D, round worm in branch of bile duct. S, site of subphrenic abscess, having burst in two places through the diaphragm into lower lobe of right lung. N marks the place behind which larger abscess burst into pericardium. R, abscess in liver. Heart shows purulent pericarditis.

The object of this paper is to show that, in spite of the extraordinary frequency and remarkable number of lumbricoid worms which may be harboured without causing any great inconvenience, in a small percentage of cases they are responsible for pathological lesions of great severity and cause irreparable damage to tissue. Ascariasis therefore should always be considered a serious disease, calling for early diagnosis and

the prompt administration of repeated courses of santonin, acting on the principle that where one worm is expelled more remain behind, and being guided as to the efficacy of the treatment by the presence or absence of ova in the stools.

A CASE OF PARATYPHOID FEVER "A" WITH RELAPSE.

BY MAJOR W. R. P. GOODWIN.
Royal Army Medical Corps.

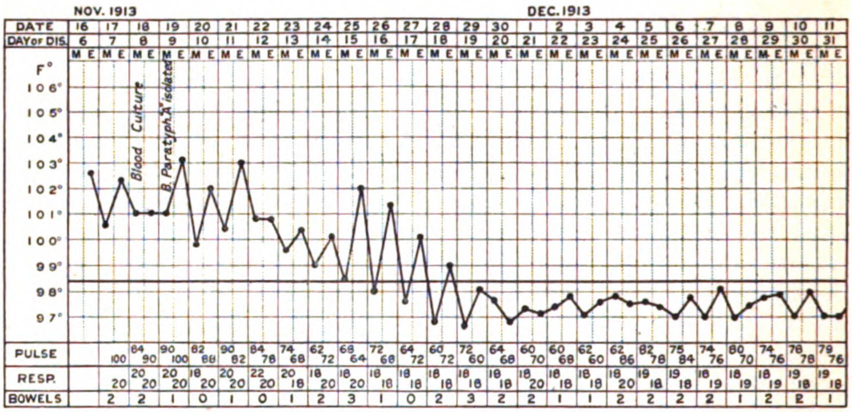
THE following case of paratyphoid fever "A" is interesting as showing a typical relapse. Corporal M., East Yorkshire Regiment, was admitted to the Station Hospital, Fyzabad, on November 16, 1913, having been transferred from camp near Sultanpur, where his regiment was undergoing battalion training. He had been feeling unwell for some four or five days previously, with headache, constipation, and general malaise. On admission to hospital, beyond a coated red-tipped tongue and the general appearance of a man with fever, he exhibited no pathological physical signs of any note. Examination of blood smears failed to reveal malarial parasites. A blood culture taken on the eighth day of illness showed the presence of *Bacillus paratyphosus* "A." He had an uneventful illness, except for slight bronchitis, and on November 29, that is to say on the nineteenth day of the disease, his temperature became normal. The temperature remained normal and the patient steadily improved in every way until December 13, the thirty-third day of his illness and the fourteenth since the temperature had become normal, when he complained of severe headache and feeling generally ill, and his evening temperature rose to 102° F. He had been allowed light solid food on the previous day, and it was at first thought possible that this was responsible for the change, and a return to strict liquid diet was ordered, but the change had no apparent beneficial result. Blood smears again failed to show malarial parasites, and the patient had all the appearances of suffering from a relapse. A blood culture taken on the morning of December 16, that is on the third day from the recurrence of fever, gave a positive result for *B. paratyphosus* "A." From this time onwards the patient passed through another typical attack of paratyphoid fever, similar to the first attack except that it was much more severe. This second attack was actually shorter than the first, sixteen days as compared with eighteen, but the patient suffered greatly from severe headache and sleeplessness, and the degree of intoxication was much more intense. On the eighth day from the commencement of the relapse a roseolar rash began to appear on the abdomen, this rash increased in intensity and lasted for eight days, in appearance it exactly resembled the "rose-spots" of typhoid fever. In other respects pathological signs and symptoms were absent, there was no tonsillitis, no appreciable enlargement of the

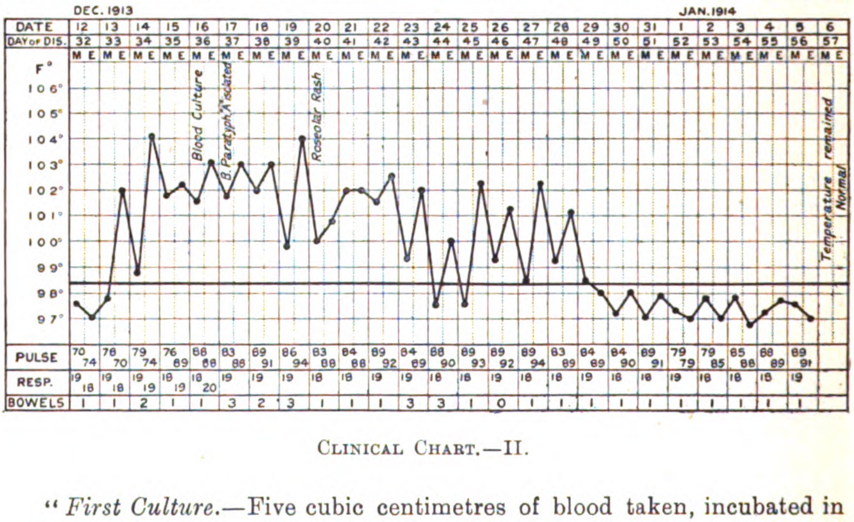
spleen, no abdominal tenderness, and no tenderness over the gall-bladder.

The relapse lasted until December 29, that is for sixteen days, after which convalescence was uneventful and uninterrupted.

As regards the cultural reactions, Major N. H. Ross, R.A.M.C., who carried out the tests, reports as follows:—

CLINICAL CHART.—I.





CLINICAL CHART.—II.

"*First Culture.*—Five cubic centimetres of blood taken, incubated in ox-bile for twenty-four hours, and then plated. The plate on the following day showed typical colonies of *B. paratyphosus* 'A.' These were put through the sugar tests, and in every one gave the indications for *B. paratyphosus* 'A.' This result was confirmed by the officer in charge of the Convalescent Depot, Naini Tal.

"*Second Culture.*—Carried out similarly to the first showed typical

colonies of *B. paratyphosus* 'A' next day. These 'clumped' with 1 in 10 paratyphoid 'A' serum, and not at all with dilutions of typhoid serum."

The case is of interest in showing a typical relapse after fourteen days of convalescence, the blood giving positive cultural reactions, in the occurrence of a roseolar eruption during the relapse, and in the absence of tonsillitis and tenderness over the region of the gall-bladder—so often seen early in paratyphoid fever—and the absence of enlargement of the spleen. Other points which one notes on inspecting the chart are the comparatively slow pulse-rate, even at the height of the fever, and the marked daily remissions in the temperature before finally becoming normal.

A PECULIAR CASE OF HÆMOPTYSIS.

By Lieutenant JAMES C. SPROULE.
Royal Army Medical Corps.

I have recently had a patient under my charge who suffered from hæmoptysis, and the interesting relationship which the condition bore to her menstrual periods appears to me to make the case worthy of record. The woman, aged 42, is the wife of a serjeant, and I was called to see her on June 27, 1913, as she was spitting up considerable quantities of blood.

The patient's previous history reveals no serious illness. She had her first menstrual period at 15 years of age, when she spat up a little blood. She always had slight hæmoptysis at each period till she was 27 years old, when the hæmoptysis on one occasion was so severe that a doctor had to be called in. Slight hæmoptysis occurred at each menstrual period thereafter. The periods were always regular, lasting four days. The amount of the flow seemed to have some relation to the amount of the hæmoptysis, as when the latter was copious the former was small in amount, and vice versa. There was no abnormal pain during the period of menstruation. She was married at 32 years of age and has been pregnant twice. The first, a boy, is alive and well. The second was a miscarriage. During the time she was pregnant the hæmoptysis ceased. The patient states that there was no lactation and that the breasts enlarged very little. About ten months after parturition the menstrual flow and the hæmoptysis re-appeared. At this time she was anæmic and the periods were irregular. Sometimes she would miss two or three periods, but at each there was definite hæmoptysis. During the last few years, just previous to menstruation, she has had severe headaches and something seems to "stick in her throat" which she tries to cough up.

The family history is of no importance. The patient is the third of a family of nine and none of the sisters suffer from hæmoptysis.

On examination the patient was found to be emaciated and anæmic; the lungs normal; the breasts not enlarged although there was a dark

aureola around the nipples. The heart was normal. The stomach was enlarged and succussion easily obtained. The uterus was not palpable. The patient was in a menstrual period. She told me she had been coughing up blood since the morning and showed me a receptacle with about half a pint of bright-coloured blood in it which was not frothy. She was put on a mixture containing calcium chloride gr. 10 per dose, three hourly.

On the 28th I again saw the patient. The hæmoptysis was more profuse than it had been the previous day. As she was becoming uneasy I gave her a hypodermic injection containing ergotinine citrate gr. $\frac{1}{100}$ and morphine tartrate gr. $\frac{1}{6}$ at 11 a.m. The hæmoptysis stopped about half an hour after this and remained absent till the afternoon, when she took some hot tea, after which she spat up a little blood. The stools were normal in colour and consistency.

On the 29th the patient looked much better. There had been no hæmoptysis since the previous afternoon. The menstrual flow had stopped. She was out of bed and in her usual state of health two days after the cessation of hæmoptysis.

I regret that I was unable to watch this case for a long period, as I was sent for duty to another station on July 5. On my return I found that the patient had left the station. A short time ago I had a letter from her in which she stated that her menstrual flow was irregular, small in quantity, and had almost stopped. She also stated that of late there had been no hæmoptysis.

I think the interesting points in this case are:—

(1) The definite history of hæmoptysis occurring and continuing through each menstrual period.

(2) The cessation of hæmoptysis during pregnancy.

(3) The re-appearance of hæmoptysis after parturition at the same time as menstruation.

(4) The history of feeling something "stuck in the throat."

(5) The cessation of hæmoptysis when the menstrual flow was ceasing.

From the history and examination of this patient I concluded that this was a case of vicarious menstruation. I have looked up several authorities, but up to the present I have been able to find very little literature on the subject.

In conclusion I must thank Dr. Payne and Captain Walshe, R.A.M.C. (S.R.), for their many valuable suggestions concerning this case.

A CASE OF ACUTE POISONING BY BETA EUCAINE.

By Lieutenant L. F. K. WAY.
Royal Army Medical Corps.

Poisoning by beta eucaine being so rare I venture to report a case which occurred while I was doing a circumcision on a young healthy soldier. The solution of beta eucaine and sodium chloride had been freshly prepared and a few drops of adrenalin added. A quantity of this solution containing rather less than two grains had been injected into the body and root of the penis. As the operation was about to be started the patient became very quiet and pale, and said he felt faint. His limbs began to twitch, and the little finger of the right hand became tightly clenched. His breathing became slow and laboured, the pulse-rate was increased, and the pupils contracted almost to the size of a pin's point. He became very much cyanosed, his breathing nearly stopped, and he completely lost consciousness. Artificial respiration was carried out and strychnine injected. Under this treatment he soon revived and the operation was carried out. For the next twenty-four hours he was very drowsy and sweated profusely, otherwise he made an uneventful recovery.

The interest of the case lies, I think, in: (1) The rarity of such poisoning; (2) the indication that the patient should never be left after the anæsthetic has been given; (3) the fact of the pupil being contracted, whereas in cocaine poisoning it is dilated;[1] (4) the small amount of the drug which caused such a sudden and severe case of poisoning, the dose being five to ten grains.[2]

AMBLYOPIA AND INVALIDING.

By Captain R. M. DICKSON.
Royal Army Medical Corps.

The expression amblyopia means weak or blunt sight and is used to designate a somewhat vague disturbance of vision for which treatment is of no avail. With our standard of vision for enlistment the condition is probably fairly common in the Army. I have known cases invalided as astigmatism when the real cause of the defective vision was amblyopia. An amblyopic is invariably a bad shot and his vision cannot be improved with glasses.

I wish to bring to notice nine cases of invaliding for amblyopia from India, and would emphasize the fact that many such cases have come to light and were allowed to remain in the service as the acuteness of vision was sufficient to pass the standard. These cases all conform to

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[1] Husband's "Forensic Medicine and Toxicology."
[2] Whitla's "Materia Medica."

the nervous type of the disease for which there is no discoverable cause. The other varieties of the disease must be very rare in the Army. They may be just mentioned:—

Toxic amblyopia, due to poisoning.—Quinine amblyopia is an example of an acute poisoning producing serious disturbance of vision. It is produced by repeated doses reaching a large total in twenty-four hours. Tobacco blindness is the commonest form of chronic poisoning. This must be rare amongst soldiers, as it appears to be induced only by pipe and cigar smoking.

Amblyopia due to disuse.—The common example is found in an eye which has squinted from childhood. The squint must be sufficiently pronounced to interfere with binocular vision.

Congenital amblyopia.—It is only justifiable to diagnose congenital amblyopia when other congenital abnormalities are present in the defective eye.

The details of the nine cases are shown in the table on next page.

The diagnosis involves a careful examination with the ophthalmoscope to exclude diseases of the fundus and media. The only ophthalmoscopic sign in amblyopia, pallor of the temporal half of the disc, was noted in but three cases. Retinoscopy was invariably carried out under homatropine. The majority of cases showed high refractive errors, and in no case did correcting lenses produce any improvement in the vision. Apart from the amblyopia these errors of refraction should be no deterrent to a man becoming a first-class shot when provided with suitable glasses. I may quote two high astigmatic cases in evidence.

Myopic astigmatism—

Right eye $\dfrac{-10}{-5{\cdot}5}$ Left eye $\dfrac{-4{\cdot}5}{-2{\cdot}75}$

Third-class shot without glasses.
Good first-class shot with glasses.
Hypermetropic astigmatism—

Right eye $\dfrac{+5{\cdot}5}{+4{\cdot}5}$ Left eye $\dfrac{+4{\cdot}5}{+3}$

Bad third-class shot without glasses.
Marksman one month after glasses provided.

The most important and most constant symptom of the disease is concentric contraction of the field of vision, and this was present in every case. The field can be tested accurately only with the perimeter, and it is noteworthy that this symptom cannot be malingered. There are two points about the form of contraction which help to distinguish it from concentric contraction found in other diseases: (1) It affects both eyes

	Musketry classification	Vision. R.	Vision. L.	Colour sense	Fields of vision	Retinoscopy. R.	Retinoscopy. L.	Ophthalmoscopic examination	Remarks
1	*Bad 3rd Class shot*	$\frac{6}{36}$	$\frac{6}{60}$	*Defective* ..	*Marked contraction*	+4·5 / +6	+3 / +6	*Temporal half of discs pale*	*Vision always bad.*
2	Never qualified ..	$\frac{6}{36}$ to $\frac{6}{60}$	$\frac{6}{36}$ to $\frac{6}{60}$	Colour-blind	Marked contraction	+2 / +1·5	+2 / +1·5	Temporal half of discs pale	Vision always bad. Wore glasses for three months without improvement.
3	Bad 3rd Class shot	$\frac{6}{36}$	$\frac{6}{36}$	Defective ..	Very marked contraction	+6 / +7	+6 / +7	Fundi normal	Vision always bad. Returned from signalling course.
4	Bad 3rd Class shot	$\frac{6}{60}$	$\frac{6}{36}$	Defective ..	Marked contraction	+3·5 / +5·5	+4 / +6	Fundi normal	
5	Third Class shot ..	$\frac{6}{24}$	$\frac{6}{36}$	Colour-blind	Marked contraction	+2·5 / +2·5	+3·5 / +3·5	Fundi normal	Absent from school for a year on account of bad eyesight. Could not see to read.
6	Bad 3rd Class shot	$\frac{6}{36}$ to $\frac{6}{60}$	$\frac{6}{36}$ to $\frac{6}{60}$	Defective ..	Marked contraction	Em. / +3	Em / +3	Temporal half of discs pale	Always had difficulty in reading.
7	Bad 3rd Class shot	$\frac{6}{36}$ to $\frac{6}{60}$	$\frac{6}{36}$ to $\frac{6}{60}$	Colour-blind	Very marked contraction	+6 / +5	+4·5 / +5·5	Fundi normal	Vision always bad. Invalided for defective vision 1907. Re-enlisted 1910.
8	Bad 2nd Class shot	$\frac{6}{36}$	$\frac{6}{36}$	Defective ..	Very marked contraction	+1·75 / +1·75	+1·5 / +1·5	Fundi normal	Latent internal squint. Corrected with No. 3 prism.
9	Bad 3rd Class shot	$\frac{6}{36}$	$\frac{6}{24}$	Defective ..	Marked contraction	+5 / +4	+5·5 / +4·5	Fundi normal	Periodic internal squint R. eye.

more or less equally. (2) It is almost uniform in degree in each meridian.

In three cases the acuteness of vision was found to vary at different dates, and this fluctuation has been noted as a feature of the disease. Two cases showed decided signs of hysteria. One man burst into tears on the range, and another became so excited that he was considered dangerous and his rifle was taken from him. In every case the colour sense was affected as tested with Holmgren's coloured wools.

If an amblyopic fails to pass the standard of vision the only resort is invaliding. It is difficult to know what is to be done with the man who reads $\frac{6}{24}$ or even $\frac{6}{18}$, who is a very bad shot and cannot be improved with glasses. A third-class shot suffering from amblyopia would be less useful on service than is indicated by his musketry score. Nearly all his points are made at short ranges; and after straining the eyes, especially if exposed to the sun, his shooting becomes rapidly worse until he can see neither the target nor the sights of his rifle. Much trouble and expense would be saved if these cases could be prevented entering the service; but after six months' experience as medical examiner of recruits, I realize the impossibility of diagnosing amblyopia or any fundus trouble at enlistment.

There are two periods in the life of a recruit when his eyesight could conveniently be tested :—

(1) Under three months' service, if a low standard of vision is noted in his medical history sheet. It is an advantage of this period that the recruit can be rejected as unfit without any waste of time or trouble, besides the saving of expense to Government.

(2) After three months' service, if he has failed to qualify in Table A. Six months appears to be the average service of a recruit when he fires this course. It is a disadvantage that the question of the examination would be left in the hands of the regimental officer. I know of several young soldiers who were allowed to come out to India who failed to qualify in this recruits' course on account of defective eyesight. Authority for the examination is found in Musketry Regulations, preliminary training —"some men lose their power of definition when straining the eye. In serious cases the soldier should be medically examined with a view to discharge or the provision of proper glasses." The examination would require to be done by a specialist and recruits with defects of vision which would prevent efficient shooting could be rejected at once. It would be a means of still further reducing the invaliding returns, and I hope to see the matter taken up by those having authority.

THE MEDICAL EXAMINATION OF A UNIT ON MOBILIZATION.

By Captain R. H. L. CORDNER.
Royal Army Medical Corps.

On orders being received for mobilization one of the first duties of the medical officer will be the medical inspection of all ranks. It is obvious that this duty must be performed with the greatest despatch and with the minimum of disturbance to the mobilizing unit. Few medical officers could say off-hand how long the medical examination of, say, a battalion takes, and yet this is one of the first questions they will be asked and expected to answer. And the answer is one on which will depend the smooth working and co-ordination between ourselves and the regimental authorities. It is evident that some method of rapidly and accurately estimating the necessary time is very desirable, and it was with a view to arrive at some such data that the following observations were made.

To begin with, it is undesirable that the whole battalion should parade at one and the same time. Many of the men cannot possibly be seen for hours, and it is obviously unnecessary to keep them standing about when their services are urgently required for the hundred and one fatigues and duties connected with the transference of a unit from its peace to a war footing. It would seem that half-companies or units of about that size would be the most convenient. This arrangement will set free the greater part of the battalion for other duties and allow the minimum to be idle.

Now to arrange matters in this way it is absolutely necessary for the medical officer to know with a reasonable amount of accuracy the length of time required to examine a given number of men; to make out a time-table from this knowledge; and then for himself and the regimental authorities to adhere to it absolutely.

At a recent experimental mobilization an exact time-table was kept and calculations made from it, showing the following results:—

(1) The examination of each officer took 1·2 minute.

(2) The examination of each man of A flight took 0·4 minute.

,,	,,	,,	,,	B	,,	,,	0·9	,,
,,	,,	,,	,,	C	,,	,,	0·5	,,

One is at once struck by the amount of time taken over the officers, whose examination was in no way different to or more searching than that of the men. The reason was that each officer came into the inspection-room alone and undressed and dressed himself again before the arrival of the next. In practice it will be found necessary to make a liberal allowance when making out the time-table for officers. Another point to be observed with regard to officers is that they should be examined with their companies and not as is usually arranged at an officers' parade. The advantage of the arrangement is that they are kept with their men outside the inspection-room and maintain discipline and

silence amongst them. If all officers are examined *en masse* they soon melt away and the men left without adequate supervision are inclined to get out of hand. I well remember once trying to examine a regiment of special reservists. The men were collected in their barrack-rooms, without officers, and as far as I could see, without order or method of any kind. Time after time it was necessary to stop the examination and go out and order them to be quiet. This resulted in much wasted time and lost temper on the part of all concerned.

With regard to the examination of non-commissioned officers and men it will be noticed that while A and C flights took practically the same time B flight took nearly twice as long. In this case the fault lay partly with the men, who were rather slow at getting ready, and partly in some confusion with regard to a party who were segregated at the time for infectious disease. How serious this would have been in the case of a half-company will be realized when it is remembered that the delay would have disarranged the time-table to the extent of nearly three-quarters of an hour!

The last point to be considered is the loss of time between the completion of the examination of one company and the commencement of that of the next. There is bound to be a short interval while nominal rolls are being collected, signed, and handed over, and those of the newly arrived company received.

The times taken in the foregoing instance were :—

(1) Between officers and A flight 3 minutes.
(2) ,, A flight and B flight 3 ,,
(3) ,, B flight and C flight 2 ,,

This interval for purposes of calculation can be taken as three minutes.

We have now the following data to work upon in making up the time-table :—

(1) Each officer will require 1·25 minutes.
(2) Each non-commissioned officer and man will require 0·5 minute.
(3) The interval between companies will require 3 minutes.

So much for the time-table. It will be obvious that to keep to it there must be perfect co-ordination between the medical officer and the regimental authorities. The medical officer must undertake to examine each batch in the time arranged, and this can only be done if he keeps a watch on the table and sees that he gets neither in front of nor behindhand with his time-table. The point to remember is that time will not be saved by working faster than the time-table allows, as the next batch will not be ready.

In the inspection-room time will be saved and confusion prevented by internal arrangements on the following lines. One non-commissioned officer should stand at the door with orders that not more than a definite number of men, say four, shall be in the room at one time. Another wil

have a nominal roll, check the men as they come in, and see that they are ready for examination. Men should keep their caps on and see that they are not separated from their kit, otherwise there will always be one or two men dodging about looking for their belongings and getting into everybody's way. If the medical officer is in doubt as to the "fitness" of a man, he must not stop, but a mark can be made against his name on the nominal roll and all men so marked can be recalled at the end of the inspection for a final decision. The regimental authorities on their part must undertake to parade their men punctually to the time-table. They should provide nominal rolls, and the men must fall in as their names stand on the rolls. Lastly, they must see that perfect silence is maintained by the men.

Working on these lines an infantry battalion at war strength will require the following time for inspection :—

	Number	Time
(1) Officers (including attached)	30	37 minutes
(2) Non-commissioned officers and men	910	7 hours 35 minutes
(3) First reinforcements (1 officer and 99 men)	—	51 minutes
(4) Intervals between half-companies	8	24 ,,
Total—9 hours 27 minutes.		

It may be possible to examine a battalion in a rather shorter time, and if a medical officer thinks he can do so it would be easy to calculate at the rate of 0·4 minute per man. This alone would result in a saving of nearly an hour and a half. It must, however, be remembered that even a slight change like this means working at extra high pressure hour after hour, and any slacking off will at once react and spoil the smooth working of the time-table.

It is very necessary that time should not be lost in handing over the medical history sheets at the conclusion of the parade. These should be arranged according to the nominal rolls, and should be checked by an officer or non-commissioned officer during the examination of the men. A list of the medical history sheets not handed over, with particulars of where the sheets are (for example, those of men in hospital or away on detachment duty), should be attached and a receipt obtained.

In conclusion, I would urge medical officers to make all arrangements personally with the regimental authorities, and not leave the details to subordinates and then grumble if there is unnecessary confusion, delay, and loss of valuable time.

RECRUITING IN SCOTLAND.

By Lieutenant-Colonel J. H. E. AUSTIN.
Royal Army Medical Corps.

Recruiting in Scotland probably differs in some respects from recruiting elsewhere, by reason of characteristics peculiar to Scotsmen generally, especially as regards their clannishness and thrifty dispositions, and the care they take in "looking before they leap." The first trait is often to be observed in the recruiting office in Edinburgh, where, if a batch of recruits from one locality come up together for enlistment, if one of their number is rejected and the others passed, the eligible ones often refuse to be attested, so that it is then desirable to stretch the already elastic tests a little further, and secure the unwilling ones by passing their "pal" also, the latter being got rid of later on, unless a very unexpected improvement takes place in his condition. Their thrift is looked after in the annual training of some of the special reserve battalions, which are held as early in the year as possible to enable the men to get to their work as fishermen the moment the training is over, and as many of these men come from out-of-the-way places in the North of Scotland, they get their fare paid by Government from where their homes are situated to a point nearer their ultimate destination, and so save a considerable amount of money which otherwise would have to come out of their own pockets.

It seems curious that though Scotsmen are found in numbers in every part of the world, and usually doing well, so many of them show a great disinclination to leave their native localities to go abroad as soldiers. They are quite willing to enlist in the special reserve, but will not join the line. I do not think this reluctance is altogether due to their love of home ties, but from an objection to binding themselves to go anywhere they may be sent for a certain number of years, and a doubt as to their future.

Possibly, if the number of men allowed to extend their service and thus enabled to qualify for a pension is increased, their views on this subject may change, and they will come to look upon a definite career in the Army as being as good as, if not better than, emigration, which takes so many eligible recruits from Scotland. Apart from this feeling the environment of the inhabitants of many remote places in Scotland—especially in the Islands—leads them to acquire a very unambitious and sluggish temperament. In these places they can earn enough money to keep them for a time, and loaf about doing nothing until it is finished; even the shops in these neighbourhoods do not open till late in the mornings, no one being out of bed and about until well on in the day. To arouse this class of individual to any sense of his duty as a citizen of the Empire is indeed a labour, and requires recruiting serjeants and others to be imbued with the zeal and perseverance of Salvation Army officials. I feel convinced that nothing but continuous and energetic

methods will ever lead to an improvement in recruiting in these localities.

During my visits to the Islands of Lewis, Harris, North and South Uist, and Stornaway, I had the opportunity of hearing the views of many people who spend their lives in and about these places, such as Roman Catholic priests, officials on the boats which ply between the Islands, policemen, hotel-keepers, etc., and they all agreed that there was plenty of material for the Army, but that to get recruits required energetic measures taken locally. If marches could take place through the larger villages, military training be carried out in some of these districts, lectures given, illustrated where possible by kinema films, it would get the people to understand, take an interest in, and learn something of a life in the Army. I also think that more army posters should be displayed than are seen at present, printed in both English and Gaelic. It is astonishing in what out-of-the-way places picture houses are now found, and as there is so very little to relieve the monotony of life in the Islands, I think any good lecturer would be assured of an audience and the pictures would prove of great interest.

These Islands and their inhabitants are both undoubtedly fertile, and the majority of the people are of good physique, healthy, and long-lived. The old men retain their vitality, and can work well until an advanced age; the women also, long after the time Nature permits of their resting from their labours in a physiological sense, continue working at various employments. It therefore seems a pity that from such a hardy stock one cannot obtain more recruits for the Army, especially as I was told many fine specimens of the London police come from these parts.

Recruiting in the larger cities such as Edinburgh, Glasgow, and Dundee, is moderate, the class of recruit on the whole not being as good as one could wish from a physical point of view. Many who enlist from these towns do so for the sole reason that they can get no work, and are often in poor condition. The men, however, improve wonderfully after a short time at the depots, the training and good food acting most beneficially, a fact very patent to recruiting staff officers, though at times they seem to hold a somewhat exaggerated opinion of such benefits—judging by occasional efforts on their part to get some very indifferent specimens passed by medical examiners of recruits if found amenable enough.

A few months ago the "Army Film" arrived in Scotland, and when shown at one of the picture houses in Princes Street, Edinburgh, drew large crowds during the week it was on view. During this period recruiting in Edinburgh fell off considerably; whether this was due to prospective recruits first visiting the show before making up their minds to enlist or not, or whether it was merely a coincidence, is difficult to say. There was, however, no doubt about the interest the public took in the exhibition, but it is to be regretted that the film was not also on view at a lower admission fee at picture houses in the Leith, Dalry, and

Fountainbridge districts, as these are thickly populated neighbourhoods where the artisan and labouring classes live—people from whom one would more naturally expect to obtain recruits than from the audiences found attending the house in Princes Street. With the exception of officers and soldiers at one or two special performances, the audiences were chiefly ladies and spectators to whom the recruiting question does not appeal in a personal way. Though they certainly appeared deeply interested in what they saw, their interest in the proceedings was more in the nature of a criticism of the film from a spectacular point of view; one of the ladies present commenting on the physique of the centre figure in one scene, whose legs certainly appeared more naturally adapted for closely encircling the body of a horse than showing to advantage as an infantry soldier wearing a kilt. Another remark I also heard a lady make was when she was watching a scene depicting infantry advancing under artillery fire in extended order. "Of course," she said, "the men would not expose themselves like that if there were real bullets about"—failing apparently to see the object of the picture and taking a decidedly pessimistic view of the bravery of our soldiers under fire. The films depicting the work of officers and men of the Royal Army Medical Corps, which alternated with those recording the treatment of a sick or injured horse, were well shown and should tend to inspire confidence in the relatives of men on active service, for no one could help but admire the neatness and dispatch with which the injured were being dealt with.

AN UNUSUAL FRACTURE.

By Captain A. G. WELLS.
Royal Army Medical Corps.

The following case, being one of a rare kind of injury, seems worth recording. The patient, Private B., was sent to me for operation for "internal derangement of the knee-joint." He gave the history of an accident in 1905 while playing football. He was charged and fell, doubling his leg under him. On getting up he was unable to straighten his knee-joint, and there was a great deal of pain on the outer side. He was admitted to hospital, where he remained for some three weeks. The knee-joint swelled up and remained in the semi-flexed position. With rest and lotions the swelling subsided and he was able to straighten the limb. He had no more trouble until early in July, 1913, when he had a similar accident at football. Since this accident he had been unable to walk, and on bending his knee he felt and heard a "click."

On examination of the knee there was an indefinite body to be felt at the outer side of the joint. This was not movable. On flexing and extending the joint a distinct "click" was felt and heard, and gave one

the impression of something becoming caught between the femur and the tibia. There was very little pain and no swelling.

Operation was decided upon, and under chloroform the knee-joint was opened on the external aspect. The external cartilage was found normal and intact. On flexing the joint and so exposing the lower end of the femur a curious condition was revealed. On the articular surface of the external condyle there was a punched-out depression about the size of a two-shilling piece. The edge all round was irregular, overlapping, and smooth. The bottom of the depression was also quite smooth and was bare of cartilage. There appeared to be no cause for the depression, although the upper surface of the tibia was thoroughly inspected. At this stage it was found that on flexing and extending the joint no "click" was elicited. On exploring the rest of the joint a foreign body

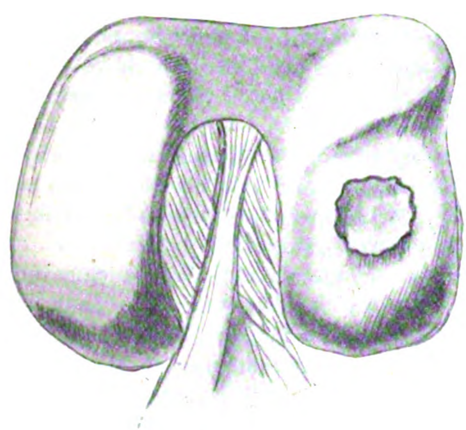

Fig. 1.

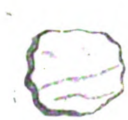

Fig. 2.

was found lying loose under the ligamentum patellæ. This on removal was seen to be a piece of cartilage about the size of a two-shilling piece. It was found to correspond exactly with the depression on the articular surface of the femur. The case was one of a circular fracture of the articular cartilage on the outer condyle of the femur, with displacement of the fragment. The smooth edges were, I take it, caused by continual use of the joint. Why the joint had not locked since the first accident is a mystery, as the man had done full duty and also played football right up to the time of the last injury. That the fragment was displaced at the first injury was evident by the smooth rounded condition of the edges.

The diagram shows roughly the appearance of the femur and the fragment.

Lecture.

A SINGLE DIVISIONAL FIELD AMBULANCE.[1]

By Lieutenant-Colonel G. CREE.
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The subject I am putting before you, namely, the substitution of the present three field ambulances with a division by a single unit, is one that will, I think, commend itself to you all. The idea at first sight may seem rather revolutionary, but I hope that when you have listened to what I have to say you will have been persuaded to agree with me, at any rate in the broad principles involved. I must caution you that I am giving you only a general outline of my ideas and have purposely not entered into details, because they would not, I think, be useful at present and would only weary you.

The questions that naturally arise are: Whether there is any necessity for a change, and what has brought about this need? Is not our present field ambulance satisfactory for all purposes demanded of it, and what additional benefits would any new organization give?

If we look at the changes that have taken place during recent years in the administration of the division we find two causes at work, first, the introduction of mechanical transport, and second the modern development of the functions and composition of the division itself. Previous to the introduction of mechanical transport, the distance a division could be separated from railhead was a question more or less of the capabilities of the horse, and as these distances increased the difficulties connected with the supplies increased in direct ratio. But now with motor-lorries the majority of these difficulties have been overcome, with the result that the mobility of the division is greatly enhanced, and a distance of forty miles between it and railhead is contemplated with equanimity. This naturally means that the depth of the division must be increased, and refilling points for supply vehicles may easily be nine or ten miles behind the fighting troops. We are supposed to utilize the returning motor vehicles as far as possible for the clearing of our sick and wounded, but can we look without misgivings on a distance of eighteen or twenty miles for our ambulance wagons, in addition to their other duties? Such distances to mechanical transport are nothing. If the motor-lorries could come into the fighting area and there collect from

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[1] A paper read before the Aldershot Command Military Medical Society, on February 24, 1914, Colonel S. Hickson, K.H.S., in the Chair.

the field ambulances, our difficulties would be modified, but that can scarcely be contemplated, as these vehicles have to keep to a time-table and delays such as would arise could not be permitted.

As regards the changes in the division itself, during the past ten years or so the division has developed from a mere collection of units into an organized unit itself, and has now become a higher fighting unit. I am speaking of the division of the expeditionary force; the exact composition and the duty expected of this force have led to the development of the division. If we look at the changes that have taken place, we shall see that they all point to two things: (1) The consolidation of the various integral parts. (2) A more centralized control over them. To take the most striking changes and think in what way they have come about, will help us to consider presently the changes I propose in our divisional medical units.

Taking first the signal company: Previously each unit had a certain number of men trained as signallers, and so long as units trained by themselves this answered all right; but with the collection of units into larger organizations it was found that there was a want of cohesion when the more elaborate work of communicating the duties of the larger organizations in the field arose. From this sprang the necessity of a distinct and separate signal service with a central divisional control. Next, the divisional train: Here again the transport up to a certain period has been entirely regimental, and as with the signal service, as long as units were employed as such, worked well; but with the amalgamation of these units into a division it was soon apparent that serious defects existed which demanded a rearrangement, with the result that the divisional train came into existence. And again a third instance is the ammunition column, whose history is much the same as the foregoing, that is, a conversion of regimental and brigade organizations into a divisional one, with an economical and efficient control from the divisional head-quarters. There are probably others to follow, and in this connexion I would recommend for your perusal an article in the *Journal of the Royal United Services Institution*, September, 1913, entitled, "The Organization of a Division," by "N."

In view of the foregoing facts are we justified in not following the lead of the others, and, without wishing in the least to belittle the present field ambulances, can we say that they are in accordance with the modern views, and that their organization, equipment, and even employment could not be improved and simplified, both for our own benefit as well as for the administration of the division? Of course the field ambulance as it stands, as far as actual service is concerned, is an untried unit, but with its actual employment in medical exercises, and its theoretical use in staff tours and war games, we have gained an idea of its capabilities and deficiences.

If we consider the origin of the field ambulance, we shall gather the

reason of the majority of its defects, and also its present method of tactical employment. We may take it, roughly, that the field ambulance is the outcome of the amalgamation of the brigade bearer company and field hospital, and the three field ambulances for a division the result of the fact that there are three brigades to that unit; and here I think is the palpable explanation of the difference between our present arrangements and what is the case with the remaining administrative units of the division, which I submit we should copy.

The assistant director of medical services of a division has now three commanding officers to deal with, and three units to partition. The three commanding officers probably each have a different idea of what the assistant director wants, and a different method of carrying out his orders. The allocation of the units in the field is more difficult when there are three to place, and must lead to a certain amount of overlapping of the various constituent parts and the mixing up of the parts of the various ambulances employed. There has arisen a custom of allotting in action a field ambulance to each area covered by each brigade, and this leads to a rigidity of employment which hampers their redistribution to meet further contingencies. It has also come about that on the line of march a field ambulance is placed in rear of each brigade. What would happen in the event of an encounter battle? Would we not find our ambulances blocking the road for the deploying troops behind, and would we not find ourselves committed by this division of our units to a position that might seriously hamper any future change in their disposition? Again, I have found a custom has arisen of bivouacking a field ambulance in each brigade area. This may be convenient from a bivouacking point of view, but by doing so we are handing each unit over to each brigade, and the orders for that unit have to go through the brigade commander instead of direct. It also gives the brigade commander the idea that the field ambulance is necessarily to be employed in his brigade. Moreover, in the field with three units, there would probably be three places at least where the wounded would be dumped for future removal to railhead, instead of, as I suggest there should be, one point where all wounded, both slight and serious, should be collected for clearance, much on the lines of the "refilling point" of the supply vehicles.

Now all these are the outcome of having three units, and could be abolished if there was only one. Are we sure that in future there will be three brigades to a division? I think signs point to the fact that this will be changed.

I suggest what is required is one field ambulance to each division. Think of the simplicity from the point of view of the assistant director of medical services. One commanding officer to deal with, and one unit to partition. It would also be a genuine divisional unit and should bivouac by itself.

There are two ways of arriving at a single field ambulance, and these

are: (1) By amalgamating the present three units under one commanding officer, and rechristening it. (2) By creating a new unit altogether on different lines. I plump entirely for the latter.

By (1) we are at the least only creating a makeshift unit, and carrying on many of the present features that are better done away with. By (2) we are getting a free hand to introduce modern ideas and methods which are eminently necessary, and which I hold are going to simplify the difficult task of getting out of the way of the fighting troops that serious impediment, the sick and wounded.

My suggestions are: (1) One divisional field ambulance. (2) Abolish the horse-drawn ambulance wagons and substitute for them light motor-wagons which could be designed to carry 3 lying down and 6 sitting up, or 12 sitting cases each. (3) Substitute a wheeled stretcher-carriage for the present hand-carried one. (4) Abolish the tent division altogether. (5) Reduce the number of non-commissioned officers and men of the nursing section and increase the bearers. (6) Let the head-quarters of the field ambulance compose the divisional collecting station, and form a centre to which all wounded are dispatched.

The arguments in favour of these are:—For a divisional field ambulance a more perfect administrative control, a greater elasticity of the unit itself, and capability of coping with situations as they arise.

The horse-drawn ambulance wagon is slow moving, and its capabilities limited by the endurance of the horses drawing it. If we remember that in the majority of instances those horses will have done a march, and some of them a long round of collecting morning sick from units, before they are employed in their proper sphere of collecting the wounded from the battle, it will be seen that at the most critical time these teams will be tired out, and incapable of performing journeys of any distance when they are wanted to do so. The horse-drawn vehicle also limits the distance at which the head-quarters of a field ambulance can open behind the firing line. With motor vehicles there is no such limitation of work done, or of distance covered. It might be urged against this, that the motor vehicle is incapable of going across fields and broken country, but in the United Kingdom or Western Europe would this ever be necessary? There are, as a rule, a multiplicity of roads all fit for light motor traffic, and it is a fact that no scene of action would be so far from one that the work of the bearers in bringing the wounded to the motor-wagons would be appreciably increased. By substituting a motor for a horse-drawn vehicle another very important fact is accomplished, and that is a reduction in the number of wagons required for a division. At present there are 30 ambulance wagons to a division, the carrying capacity of which is 120 lying, or 360 sitting, or 180 sitting and lying, or an average accommodation of 220 for the division, which works out roughly at 1·4 per cent of the strength; so if 5 per cent only of the division were wounded, three journeys at least of these wagons would be required.

Taking the journey at 6 miles each way, and the pace 3 miles per hour, each wagon would take 4 hours at the least to accomplish the trip, or 12 hours to clear 5 per cent of wounded. With 16 motor-wagons, each carrying 3 lying and 6 sitting, or 12 sitting, an average of say 10 to each wagon, the 16 wagons would carry 160 at each journey, and perform a journey of 10 miles in half an hour; and giving a quarter of an hour for taking the wounded out of the collecting station, the entire trip would be done in 1¼ hour, as against 4 hours for the horse-drawn vehicles. That is, half as many wounded again could be dealt with in the same time with motor-wagons, and that with a reduced number of vehicles. The motor vehicle would also allow the head-quarters of the ambulance being opened much farther back than is at present the case. Ten miles would be a good rough rule. Here the wounded would be well out of harm's way, and, another important point, could be disposed of so that they would not block the road for other traffic in any way.

Now as regards the stretcher. Any of you who have not had personal experience in carrying a loaded stretcher (and most of us have done so at some time or another of our service) know the extremely hard work it is, especially over broken ground, and in how short a distance it becomes physically impossible to go farther without a rest. In fact I think fifty yards is about the limit of most men's capabilities in this respect, and we should welcome anything that would ease the strain and at the same time increase the pace at which the wounded could be moved. Some years ago, when I was stationed in a foreign garrison where stretchers were very much used to convey sick, where the roads were rough and very hilly, we found that the strain imposed on the stretcher-bearers was very great, and consequently the pace the sick travelled very slow. We were able to get an Ashford litter from the ordnance store, and by fitting a couple of drag-ropes on to the axles, we found that with three bearers we were able greatly to increase the pace at which we could move, and also do that without incommoding the sick in any way, and save the bearers the appalling strain. Again, the last time I was in India, with a very rough and clumsy wheeled stretcher that probably most of you know, I found the former experience hold good, the secret of the whole being the drag-ropes on the axles. It will probably be said that the wheeled stretchers could not negotiate all the various conditions of country that might be met on active service, but I cannot myself imagine any conditions where such would be the case in this country or Western Europe, that is, provided the stretcher-carriages are intelligently designed and used. I have always used them with three bearers, one on each drag-rope, and one between the handles, and this is sufficient for all ordinary work; I have added a fourth, however, as a reserve. On the line of march, the wheeled stretchers could be carried in a wagon, and by having detachable and interchangeable wheels, they would pack fairly

closely. If, however, an engagement was expected, or when the bearers were following deploying troops, the stretchers could be wheeled along the roads with little effort. The present number of stretcher squads to each field ambulance is 18, that is 54 for the division, but my plan would give you 80 wheeled stretchers to each division, an increase of 26 stretchers. Think what that would mean to the officer commanding the field ambulance.

Now I come to a proposition that I am afraid some will look upon with horror, and that is the abolition of the tent division entirely. Yet if we look at the reason of our existence, and why we are in the field at all, we shall see that by carrying out my suggestion we are only realizing our best ideals. Our first and foremost duty is to remove the wounded as quickly as possible from the neighbourhood of the fighting troops and get them to where they will be in comparative comfort, and where their various injuries and ailments can be satisfactorily looked after. In the days of horse-drawn traffic, the distance between the fighting troops and railhead and the nearest stationary hospitals made it quite necessary at times for the officer commanding the field ambulance to be in possession of means to accommodate his wounded, till the slow-moving vehicles from behind could come up to him and relieve him of his charges. With motor transport this has all disappeared, and a railhead forty miles away would not mean untoward difficulties in getting rid of the wounded, or cause them any undue suffering. My opinion, consequently, is that there should be no hospital accommodation, speaking widely, nearer than railhead.

The next proposition follows as a natural sequence on the foregoing. With the abolition of the tent division, the necessity for a number of non-commissioned officers and men of the nursing section disappears. There are at present 6 serjeants and 63 privates of the nursing section present with the division; I propose to reduce these to 1 non-commissioned officer and 10 men. This will give 320 bearers with 80 stretchers in place of 377 bearers with 54 stretchers, an increase of 26 stretchers and a decrease of 57 bearers.

With the rapidity of movement consequent on the motor-wagon and the wheeled stretcher, the necessity of the dressing station will disappear. This I contend is an unmixed blessing. The tendency has been to erect tents and form dressing stations far too readily, and often before any real necessity for them has arisen, due, I think, to several factors, which are the slow-moving horse-drawn wagon and the consequent necessity of holding on to the wounded instead of being able to dispatch them to the rear at once, the discomfort of the ambulance wagon and a desire to prevent undue suffering of the seriously wounded, and, sometimes, to the simple fact that the tents were there and use had better be made of them. These dressing stations lead to the immobilizing of the field ambulance to a certain extent, and always to a slowness in following the troops. It is

more or less natural that with the extra labour involved in the erection of tents, the officer commanding the field ambulance would feel some compunction in changing his position freely. Even when no tents are used and accommodation for the wounded is found in the adjacent houses, the same slowness of movement appears. The divisional collecting station as at present constituted and described in regulations, is a well-defined spot, previously selected for the purpose, to where the slightly wounded are directed to walk. I propose to alter the constitution and function of this place so that it will combine the duties of dressing station and collecting station in one, and form the pivot on which the whole collection of wounded will turn. As is now the case, this point will be selected by the assistant director of medical services and notified to all concerned. Here the head-quarters of the field ambulance will proceed and make arrangements for the reception of the wounded. Here also all the transport of the field ambulance will remain, including the ambulance wagons, and all wounded brought. With motor transport, great latitude can be exercised in the selection of this place, and a few miles one way or the other would make no difference to its utility. It should be placed behind the ammunition column, and in such a spot that there would be other roads than the main one converging on it; that is to say, place it somewhere that is accessible to the wagons and yet in such a place that the movements of the wounded will not interfere with the main traffic of the division. Still, the fact must not be lost sight of that it must be accessible to the motor-lorries of the supply column, in fact the refilling point of the train would afford an excellent guide to the selection of the collecting station. In this country and in Western Europe I do not think any difficulty would be experienced in finding a suitable position.

Following on these lines I have suggested that the new unit should be organized as follows: it will consist, not including attached persons, of a head-quarters and four bearer sections.

The detail of the headquarters would be, personnel: 1 lieutenant-colonel commanding the unit; 1 major, second in command; 3 captains (or subalterns), one as adjutant; 1 quartermaster; 1 serjeant-major; 1 bugler; 5 serjeants (one of whom will be for nursing duties); 5 corporals (4 as wagon orderlies); 35 privates (10 nursing section, and 12 as wagon orderlies).

Vehicles: 1 bicycle; 1 motor-car, for the use of the officer commanding; 16 motor ambulance wagons; 2 three-ton motor-lorries; 1 water-cart.

Each bearer section will consist of, personnel: 4 officers, captains or subalterns; 4 serjeants; 1 bugler; 80 rank and file, of whom 20 should be lance-corporals. The section will be divided into sub-sections consisting of 5 stretcher squads, under the supervision of 1 officer and 1 serjeant. The vehicles will be: 1 bicycle; 1 water-cart; 1 cooker; 20 wheeled stretchers.

How does this compare with what at present exists for a division? There are now 30 officers (including 3 quartermasters), 3 warrant officers, 39 serjeants, 9 buglers, and 495 rank and file, and 3 bicycles, 9 forage carts, 9 water-carts, 3 cookers, 30 ambulance wagons, and 18 general service wagons. So there is a saving of 8 officers, 2 warrant officers, 18 serjeants, 4 buglers, and 135 rank and file, and of 39 vehicles, not including the wheeled stretcher-carriages.

Those are my suggestions, and though there is a considerable reduction, both in personnel and vehicles, I do not think that this is any detraction from its utility. On the contrary, I believe by organizing a unit on these lines we are simplifying the work, and attaining a degree of mobility in every sense that the old units cannot give, and I trust that I have been able to show you the additional benefits to be derived from such an organization. Anyway it behoves us to make the fullest use of the capabilities of mechanical transport, and whether we do it in the field ambulance, or in the clearing hospital, is a moot point. Personally, I think it should be both. Such a change as I contemplate would naturally modify our tactics, and probably I think simplify them, but such modifications must be left to more able hands than mine to make, and I can only point out the need of them.

Discussion.

Major Travers E. R. Clarke, D.A.A.G., said: I have taken Colonel Hickson's invitation to "get up and say something" in the light of a command, but I feel considerable misgivings at being the first to make any comment on Colonel Cree's admirable lecture. The first point that struck me was the statement made by the lecturer that, by the introduction of mechanical transport, the "mobility" of a division has been enhanced. I think he really means that a division has now a wider field of operations in relation to its railhead than heretofore; it is not, however, actually any more mobile. I think the lecturer has rather over-estimated the difficulties he considers the assistant director of medical services of a division must suffer in having three units and three commanding officers to deal with. The position of this assistant director is analogous to that of an infantry brigade commander who has four units to control, or possibly a better comparison would be that of a field artillery brigade commander who has three units under his command. Anyway, in neither case has any great difficulty been experienced in the command of these units. Moreover, if there were to be one field ambulance only in a division, could the retention of the assistant director of medical services be justified? We have a parallel in the recently created field squadron which is to absorb the four field troops of the cavalry brigades composing the cavalry division. With the formation of the field squadron the necessity of having a commander and an

adjutant of cavalry divisional engineers disappears, and both these officers have consequently also disappeared. I think, too, the assistant director would be deemed the fifth wheel, and his disappearance would be one of the outcomes of Colonel Cree's suggested remodelling of the field ambulance. A big unit, such as Colonel Cree contemplates, would throw a great deal of work on the commander, and I fancy in effect the single field ambulance would practically become four distinct units, each bearer section making a little kingdom of itself. With regard to Colonel Cree's statement that a custom has arisen of attaching a field ambulance to each brigade of infantry, and that therefore it may be assumed that on the line of march each ambulance will follow its brigade, I think we must accept this statement with reservations: it would not be possible, of course, for an ambulance to march in this manner when contact with the enemy was imminent. For purposes of administration, especially supply, a division when not in the immediate vicinity of the enemy sometimes marches in prearranged groups, and a field ambulance is often attached to a group; but it must not be forgotten that these groups would cease to exist as such when the tactical situation demanded. I think the lecturer rather contemplates a division employing one refilling point only, and he fixes this refilling point at some nine or ten miles behind the fighting troops. The efforts of the quartermaster-general's branch of the staff of any formation are, as a rule, directed to the practicability and possibility of securing good refilling points close up to the troops, and I think the occasions would be rare when some nine or ten miles separated a refilling point from the nearest body of troops; of course, when two divisions are using the one road, the conditions alter somewhat. Moreover, a divisional commander has the power to fix any number of refilling points; he is not confined to one, and it is possible that a concentration of wounded at one point, which Colonel Cree suggests should be the refilling point, would not be such as expeditious a way of evacuation as collection at several places.

I think it is agreed on all sides that we cannot rely on the mechanical transport vehicles of a supply column as a normal method of getting the sick and wounded away from the front; these columns have to keep practically scheduled time at railhead, and hence it would only be on exceptional occasions that we could make use of them. The use of the vehicles of an ammunition park for this purpose possesses, too, many drawbacks, and their employment can I think be disregarded.

In discussing this question, we must, in my opinion, first consider what are the limits of the zone of action of the field ambulances and the clearing hospitals. As matters stand at present, a clearing hospital is a cumbrous affair, it is hard to move, and when all its tentage is pitched and its paraphernalia unpacked and spread out, it cannot be shifted without great difficulty. It appears to me, therefore, that we must divest the clearing hospital of nearly all its tentage and of a great deal of its

equipment. Once shorn of this a motor-lorry should be able to move it, and its sphere of utility would be increased.

The abolition of the tent division of a field ambulance, suggested by Colonel Cree, has many supporters, but I think that very serious consideration would have to be given to the question before dispensing with the trained personnel of the medical units nearest the fighting zone. The evacuation of the wounded after a big engagement would be a long process, running probably into weeks, and I think undue prominence has been given to the idea that a wounded man must perforce be sent back with all speed to the base. It seems to me that the work of a field ambulance will be limited to collecting wounded in houses or buildings of sorts, treating them as best may be, and leaving them in these buildings, with some of the tent division personnel to look after them until relieved by personnel of the clearing hospital: on relief the men of the tent division would rejoin their ambulance. I think the term "tent division" is somewhat misleading. Tents would, I fancy, be rarely used. I would suggest the title be the "nursing section" or something of this nature.

If the inspector-general of communications had a reserve supply of mechanical transport, he could send up the clearing hospital shorn of its encumbrances as I have already said, when desired. The further evacuation towards the distributing zone might then become the task of the clearing hospital, and would be done gradually. Anyway, it appears to me that the spheres of action of the field ambulances and the clearing hospitals should be more clearly defined, and then perhaps the movement rearwards of the sick and wounded will not present a task of too great magnitude.

Colonel Cree advocates the abolition of horsed ambulance wagons, and the substitution of motor ambulance wagons. I must say at first sight motor ambulance wagons appear fascinating, but it must not be overlooked that this form of transport possesses certain disadvantages. Firstly, a motor vehicle cannot run for any length of time behind a slow-moving column. Secondly, the motor vehicles must preserve a distance between each other of fifty or a hundred yards. Thirdly, motor vehicles of a heavy type are difficult to turn round on a road, and ambulance wagons collecting wounded would, in all probability, have frequent "about turns" to make. Fourthly, heavy motor vehicles cannot readily be parked off the road: it is not often that they can be taken into a field, at least if you want to get them out again. Fifthly, a big motor ambulance wagon could not easily run up and down a column past troops, guns, etc. Of course, some of these difficulties could be got over by starting the ambulance wagons some time after the division, but you could not well do this if two divisions were using the same road. Anyway, many points have to be considered before one could advocate the abolition of horse-drawn ambulance wagons altogether.

As Colonel Cree says, we have no war test by which to judge our present organization, but I am inclined to believe that many of the difficulties that he contemplates will occur in the command and administration of the three field ambulances of a division would disappear if a scheme could be devised to ensure more complete identification with their division and its training in peace on the part of the medical officers detailed to command and serve with these field ambulances in war. At command head-quarters we are working to this end, and we hope that our efforts will be successful; if so the effect will be to offer the medical officers who on mobilization will join the field ambulances some practical training in their work, and will also give them that tactical understanding of the work of a division so essential to the efficient handling and working of the field ambulance in war.

Colonel Cree has given us much food for thought, and his suggestions will be carefully considered at command head-quarters. In common with all authors, he has to suffer a deal of criticism, but if the success of a lecture can be measured by the discussion it invokes, Colonel Cree has attained a measure of success brimful and overflowing.

Lieutenant-Colonel R. J. MARKER, D.S.O., A.Q.M.G., said: You have suggested that I should make some remarks, but I really fear I have very little left to say. In the course of Colonel Cree's most interesting lecture I had made a few notes, but Major Travers Clarke has touched already on practically all of them. I would say one word in regard to the analogy which has been drawn by the lecturer between the present organization of a divisional signal company and his suggested organization for field ambulances in a division. I am a little doubtful whether that analogy should be carried very far, owing to the essentially different employment for which the two units are formed. In the signal company the organization of three sections, one with each brigade, and a head-quarters and section at divisional disposal, is dictated by the necessity at all times of keeping communication between divisional head-quarters and three units—brigades—which are necessarily at all times separated, if not in locality, at any rate in command. The field ambulances, on the contrary, are one unit for general use. A heavy butcher's bill may be incurred in only one brigade, and the others may have no casualties. That butcher's bill might conceivably, I think, tax the resources of the whole field ambulance power of a division, apart from routine work, and I think, therefore, that a centralized organization may be more applicable in the case of field ambulances than a permanent organization into "sections" for normal detached employment with three separate brigades.

Again, I would suggest that before we decide definitely on any reorganization of a field ambulance, we must have a very defined allotment of spheres of action in regard to the field ambulance and the clearing hospital. I fear in my own case I am very hazy as to where

the frontier line should be placed. But once that is clearly established I think the question of organization can be more confidently approached.

Finally, there is the factor of mechanical transport. This is always assumed to have simplified questions hinging on transport facilities enormously—among them that of removing wounded to railhead. I am not clear that it has simplified these questions so greatly. To my mind it has certainly increased the difficulty of most questions involving allotment of roads, and may be found also to have added more formidable problems of road congestion over large areas.

Lieutenant-Colonel S. Guise Moores, D.A.D.M.S., said: The lecturer thinks that, in the event of an encounter battle taking place, we should find that the field ambulances told off to follow brigades on the line of march would block the road for troops deploying. But would field ambulances be so placed in the event of there being any possibility of a general engagement with the enemy? I think not. Their disposition is entirely dependent on the enemy's whereabouts.

Colonel Cree suggests the abolition of the horse-drawn ambulance wagons and their substitution by light motor-wagons. There are practical reasons against this innovation to which Major Travers Clarke has already called attention. If we can produce a motor vehicle which can accommodate itself to travelling continuously behind marching troops, then we have solved an important difficulty. To my mind, however, motor vehicles should always be available at railhead for wounded convoy work between the railhead or heads and the fighting area. Clearing hospital personnel and medical equipment should be sent forward with them as required. If this is done there is no need for any motor transport with field medical units.

Major J. G. McNaught, R.A.M.C., said: In considering our field medical organization, we, in Aldershot, naturally have in our minds the conditions of warfare in Western Europe. At the same time we should not forget that most of our wars are fought out in uncivilized or semi-civilized countries, and that, therefore, our arrangements must be capable of modification to suit circumstances. But even as regards European conditions, we must remember that in continental armies the medical personnel with regiments is much more numerous than in our service. The senior medical officer of a German regiment of four battalions has quite a large staff of medical officers, subordinate medical officers, and trained orderlies at his disposal. He has the means of improvising temporary hospitals, if necessary, and of attending to sick and wounded who cannot, for any reason, be moved. If, as Colonel Cree suggests, we reduce the personnel of our field ambulances we should be left with too small a staff to cope with the requirements of war. As regards reducing the number of nursing orderlies with a field ambulance, I do not think this would be advisable. The nursing orderlies are not only our best-trained men, they are our most intelligent and reliable men. From what

I have read of the medical history of the recent war in the Balkans, I gather that a great deal depends on the training and intelligence of those who first deal with the wounded. Not only must they know what to do, but what to refrain from doing. Inadequate medical aid at the front means an accumulation of septic cases in the hospitals towards the rear. Besides, after a big engagement there would be many men whose condition would forbid their transport to the rear, and who would require skilled attention. As regards wheeled stretchers, their use at the front would perhaps be impracticable on account of the space they would require in transport.

Captain F. W. G. Leland, Army Service Corps, said: As a mechanical transport officer there are one or two points which I should like to criticize. It has been stated that no reasons were given for the fact that the empty supply lorries of columns are not to take back wounded, sick, etc., to railhead. The experiment was tried on the last medical manœuvres. The supply column was off-loaded by about 6.30 p.m., teas were served to the men, and the lorries left the refilling point shortly after 7.30 p.m. They proceeded to the camp and the wounded, etc., were loaded up; this took the best part of an hour. The column then went to the clearing hospital at Broadwater, where all details were taken down, and, wounded, etc., and a medical officer and staff put on board, and then the column set out for Woking, having to stop on the road to pick up some more wounded men at Milford; Woking being reached about midnight. The column returned to Aldershot after all wounded were loaded up on the hospital train, getting there about 3 a.m. Men got their breakfasts at 6 a.m. and the column left again for the previous night's camp. The difficulties of a continuance of such work speak for themselves. On one occasion on the army manœuvres, railhead was reached at 3.30 a.m. Moreover, in the future, it is more than likely that when a supply column is at the refilling point, the railhead for the next day's delivery of supplies may not be known, and the supply column may have to park at the refilling point and await orders.

Major Travers Clarke stated that from what he saw on last year's manœuvres he did not consider there was a saving in road space by the introduction of mechanical transport. As first sight this seems true enough, as a wagon and four horses carrying 30 cwt. takes up a road space of 15 yards, including 4 yards' interval, compared to a 3-ton mechanical transport lorry, length 22 feet approximately, and an interval of 50 yards behind. This certainly leaves the actual space covered, compared to loads, in favour of the horse-drawn vehicle, but this is hardly how one must look at it. We must take the time in which the mechanical transport vehicle would traverse a certain distance, i.e., the horse-drawn vehicle proceeds at three miles per hour and the motor-lorry at twelve miles per hour, so we get the saving, and this would be greater with the lighter and faster-moving lorry, capacity say

twenty-five hundredweight. The road space is lessened owing to the shorter time taken by the mechanical transport vehicles to do a certain journey.

It has also been stated that the supply of petrol would be a difficulty. With this I beg to differ. When mechanical transport was in its infancy from the internal combustion engine point of view, it was thought that for European warfare paraffin oil would be the fuel, as it was used by the inhabitants of all countries and thus would be easily obtainable, and so experimental machines were built to run on paraffin by means of special vaporizers. But these are practically out of date, and petrol has been adopted as a fuel, and will continue to be so adopted until a good substitute is provided. No difficulty has been experienced at present as regards the supply under peace conditions, and as under existing organization over a thousand lorries will be required on mobilization the few extra vehicles to be used as motor ambulance wagons would not be difficult to supply. One hundred and fifty gallons would suffice daily for the sixteen motor ambulance wagons. As regards the difficulty in parking motor-lorries, it is not always necessary to remain on roads. The First Divisional Supply Column on last year's manœuvres always parked on grass plots, common land, etc., and experienced no difficulty in moving off the following morning, even after rain. I do not wish this, though, to be taken as the general rule, as, for instance, in wet winter weather it would be almost impossible for loaded lorries to be parked in fields, etc., although we hope in the future that the non-skids recently invented by one of our officers, and with which every lorry may be fitted, will make the regular parking of the mechanical transport vehicles possible.

The Chairman (Colonel S. Hickson, R.A.M.C.) said: The meeting is to be congratulated on the interesting and instructive discussion on Colonel Cree's lecture, and our thanks are due to the Staff and Army Service Corps officers for the part they have taken in the proceedings. Our present system of field ambulance organization has been freely criticized in the past. Many officers would like to see the bearer and tent divisions separated into distinct units, as was the case in former years, and others have expressed themselves in favour of brigade field ambulances; but as our whole system of organization is based on the division, our mobile medical units are necessarily divisional units.

I do not think there is anything to be gained by providing field ambulances with mechanical transport. It would be out of place so far in front, but would be desirable if coming from the rear, that is, from the clearing hospital to the assistance of the field ambulances. I do not agree with the proposal for the abolition of the tent divisions. No doubt it is one of our chief duties in the field to get the wounded to the rear with all possible expedition, but we must remember the needs of the wounded and the proper care and treatment of them prior to transport

Some sort of hospital establishment is necessary before bundling the wounded into a wagon. It will probably be days before the wounded can be moved to the rear from the neighbourhood of a modern European battle-field, and they will have to be accommodated meanwhile either in houses or in a field ambulance.

Lieutenant-Colonel Cree, in reply, said: The criticisms on the whole have been very kind, and the paper seems to have fulfilled its purpose in provoking a most interesting series of opinions. I would, however, like to make some replies to remarks that have been made.

I did not intend to convey the idea that the duties of the assistant director of medical services in apportioning the work of the field ambulances are overwhelming; but that any measure that simplified the carrying out of any duty is an advantage. I understand that the abolition of the assistant director with the division has been thought of, and it is possible that the actual administration of the field ambulances in the field could be carried out by the assistant adjutant-general's branch; but there are other duties of the assistant director of medical services which could certainly not be done by a non-medical officer. As regards the capabilities of the suggested motor ambulance wagon to move across indifferent country and manœuvre in fields and rough land, it must be noted that the expression *light* ambulance wagon was used. At last year's manœuvres I was greatly struck with the capabilities of the ordinary London taxi-cab to cope with the varying conditions of road surface, and how they were able to go practically anywhere, and I intend that the chassis of this light motor-wagon shall not be more cumbersome than that of the usual taxi-cab. I never intended that the motor ambulance wagons should follow along the road behind marching troops, and I suggest the method of employing them on the march would be for the wagons to remain at the previous night's billet or bivouac and not move forward till the troops had arrived at their day's destination; they should then be sent forward to the fresh billets, the bearer section alone marching with the troops. The present method of collecting morning sick entails considerable journeys on the horse-drawn vehicle which would be of no consequence to a motor vehicle and simplify the whole procedure.

The greater reason for the rapid clearing of wounded is not so much for the benefit of the wounded themselves (though the moral effect of that on the troops would be great), but is that by so doing the mobility of the division would be greatly enhanced for either advancement or retirement, and the consideration of the safety of the wounded would not in any way hamper the plan of the general officer commanding.

It has been objected that motor-wagons will not be suitable in all countries, and that what might be valuable in England or civilized Europe will be of little worth in rough regions such as the Balkans. Has any transport yet been devised suitable for all countries, and is it not a fact that in South Africa our present ambulance wagons were

found unsuitable? But for such service as the expeditionary force is likely to be called upon to undertake I do not think the motor-wagon will be found unsuitable.

It appears to be certain that the lorries of the supply column and the ammunition park will be seldom available for our purposes; we must never rely on them, but make our own arrangements. Anyhow, the fact remains that since the introduction of motor transport, that is for the last ten years, we have done little or nothing to adapt it to our service, and whether the motor vehicle should be with the field ambulance or clearing hospital is entirely a matter of opinion, but it behoves us to take advantage of this most valuable asset.

Translation.

LA GUERRE DES BALKANS. ORGANIZATION ET FONCTIONNEMENT DU SERVICE DE SANTÉ DES ARMEES COALISÉES.

PAR M. COUSERGUE.

Médecin-Major de 1re Classe; Attaché au Secrétariat général du Ministère de la Guerre.

PRÉCIS BY COLONEL C. H. MELVILLE.

Royal Army Medical Corps.

THE author, who is attached to the Ministry of War, was directed in December, 1912, to proceed to the Balkans to study the working of the medical departments of the Allied Armies. His interesting report opens with a study of the raw material, the soldiers in the ranks of the various armies. He points out that there is a marked difference between the Bulgarian and Serb on the one hand and the Greek on the other.

The Serbo-Bulgarian soldier is usually an agricultural labourer: officers and men all belong to the same class. This arises largely from the fact that in these new countries a middle class (bourgeoisie) has not yet had time to form; consequently there is much good followship between all ranks, but at the same time no relaxation of discipline. The men are well built and hardy, accustomed to simple fare and privations, and not readily susceptible to disease. Their bravery needs no comment, but it is interesting to note that M. Cousergue ascribes the desperate nature of their charges to experience gained in the opening encounters of the war. The men learnt that to delay an advance merely gave the hostile artillery time to get "set," and that a fearless onslaught was the truest road to safety. He recalls the heroism of the volunteers of 1792 and relates the story of a wounded Bulgarian who had gone to the front

suffering from advanced diabetes. To enable him to do his duty by his country to the utmost he equipped himself with special diabetic bread, and carried in addition a small private medicine chest. Another, half of whose hand had been carried away by a shell splinter, said with a sigh, "It is rather small," but added with pride, "What matter, since my fatherland is so much the larger." The poor fellow must have very different feelings in the matter now, it is to be feared.

The Greek Army, on the other hand, came largely from a sea-coast population, fishermen, sailors, etc. One corps, the Evzones, consisted of mountaineers, and there were in addition numerous emigrants, rich and poor, who returned on the outbreak of war to their mother country. On the whole the Greek soldiers were of slighter build than the Serb or Bulgar, and showed "more class" (*plus fins*). They seemed less resistant to disease, but endured bravely exposure to the elements, their courage was no less conspicuous, but better held in hand, than in the case of their allies. When wounded they suffered patiently, but seemed more human, looking forward to seeing once more their families and birthplaces. The call of the sea seemed as strong to them as to the Greeks who marched with Xenophon. "The sea! the sea!" cried a young soldier in the Red Cross Hospital at Preveze as he looked at the blue waves of the Adriatic, "I am cured! I have seen the sea."

The uniforms and equipment varied in different armies, and certain special units had distinctive uniforms. The most striking of these was that of the Greek *corps d'élite*, the Evzones, whose *corps de ballet* skirts are so frequently seen in illustrated papers. More generally the uniform was of a simple nature, that of the Balkan races approximating somewhat to the Russian type. The general tint was neutral: grey in the case of the Bulgars, khaki for the Serbs, and green (*réséda*) in the Greek Army. Owing to insufficient reserves of clothing, many men in the Allied Armies were supplied with great-coats only. History again repeated itself in this respect. Just as the ragged "foot cavalry" of the South relied on "Mr. Commissary" Banks for its outfit, so the ill-furnished soldiers of the Allied Armies, after Kirk Kilisse, Lule Burgas, and other battles, supplied themselves from the spoil of the defeated Turk. M. Cousergue states that after the former battle he met Bulgarian officers who kept only their national head-dress; everything else on them down to the sword and belt was Turkish, and still bore the crescent of Islam.

The "Military Correspondent" of a certain London weekly journal, discussing in November or December last the lessons of the war, among other false deductions, referred to invisible uniforms as one of the fallacies which had been exploded by the experiences of the campaign. M. Cousergue, however, states that the opposite was the real state of the case. The Bulgars removed even the red shoulder straps of their great-coats, since they found that the unbroken line of colour "gave away" their positions. As regards foot-wear the Bulgars appear to have worn long

boots into which the lower end of the trousers were thrust. This boot seems similar to that worn in the German and Russian infantry; it is, in fact, the natural boot of the field labourer working in the muddy plains of Eastern Europe. The Serbs and Greeks used an ankle-boot, in the latter case of a French pattern and worn with putties.

M. Cousergue attributes the great rarity of foot-sore men in the Balkan Armies to the use of the national shoe or sandal, the opanki. This seems to resemble very closely the sandal (chapli) worn by natives in the North of India, and like it is worn with a leather sock (*gant de pied*). Thick woollen socks, sometimes two or three pairs, are worn inside the leather sock, and inside these a foot cloth. A new pair of opankis is readily made, when the first has worn out, from raw hide cut from the carcass of a dead transport ox or horse.

The regulation pattern equipment differed little in the various armies, but, except in the case of the Greeks, uniformity was, in practice, rare. The Bulgarians and Servians seem, as far as I can gather from other sources, to have approached the Russian model, the Greeks that of the French Army. Intrenching tools were carried by all, even by officers, and found most useful. They were used not only for the purpose for which they were intended, but also as shields for the head when advancing under fire.

The Greeks appear to have been well served in respect of rations, except on the march to Salonica. This is attributed to defective organization on the part of the lines of communication. The Serbs and Bulgars were less fortunate. The absence of railways forced them to rely entirely on bullock-wagon trains working on bad roads. At Kirk Kilisse the Bulgarian troops received no rations for three days, at Lule Burgas for five; they were reduced to anything they could pick up, cabbage leaves from the fields, and the raw flesh of dead oxen and horses strewed along the line of march. When possible each man received a kilo of bread every morning, with vegetable soup containing 200 grammes of meat. The last-mentioned was carried in the mess-tins for consumption *en route*. Country cheeses were numerous, and occasionally 100 grammes of sugar were issued. As in the matter of clothing already referred to, captures from the enemy were of great assistance.

Travelling kitchens were used in the Bulgarian and Servian Armies, but only by certain units. Others carried cooking-pots on pack-animals or in carts.

Water purification was not practised, and as a rule the men drank anything they could; often very little was available. When cholera broke out orders were issued that all water should be boiled, but lack of fuel made this often impossible.

Billeting was used when houses were available, but mostly the men bivouacked under the usual shelter tent. Occasionally the proximity of the enemy rendered this inadvisable. It is interesting here to note

that at the 3rd Divisional Conference an officer of the Royal Flying Corps stated that the regular lines of the blanket shelters used by our men on manœuvres were amongst the most easily recognizable of all indications of the position of a hostile force.

Latrines appear to have been dug but rarely, and even then with little judgment. One intended for use by cholera patients was situated a few yards from the village water supply at Semenli. It is probable that our practice in this respect would be looked on as meticulous by many Continental armies. I heard an officer who had been present at the German manœuvres of 1913 state that promiscuous defæcation was the rule. In the short period during which manœuvres last the ill-effects of such a system have barely enough time to show themselves. If a similar practice is followed in war the effects on the newly-joined reservist who comes from a well-drained town, and is not hardened by a life-long experience of village sanitation, are likely to be striking.

M. Cousergue gives a very full account of the medical organization of the Allied Armies. In both the Bulgarian and Servian Armies, French influence seems to have predominated. The various medical units were allocated to divisions, and included for each such body of troops one ambulance and several field hospitals. In the Servian Army the ambulance formed part of a medical company (*compagnie d'infirmiers*), a somewhat complex unit. It included 200 nursing orderlies (*infirmiers*) who were attached during an action for duty to the four infantry regiments (each of four battalions) in the division, working either at the regimental aid posts or with the regimental stretcher-bearers. In addition there were eight reserve patrols of one corporal and twelve men each, forty-three *infirmiers* for work in the ambulance itself, signallers, buglers, etc., a total establishment of non-commissioned officers and men amounting to 359. Each ambulance had seven medical officers. This very cumbersome and complex unit does not compare favourably with the three independent and compact field ambulances in one of our divisions. The Bulgarian ambulance was simpler, and included merely 200 stretcher-bearers, twenty-four *infirmiers*, and eight to ten medical officers. The transport of the Servian unit demanded thirty-two wagons, whereas six sufficed for that in the Bulgarian service.

The establishments laid down appear, however, to have existed mainly on paper. At Kirk Kilisse the shortage in medical officers was 60 per cent of establishment, and in stretcher-bearers 80 per cent. Medical men, in fact, did not exist; 700 out of the total of 785 medical men practising in Bulgaria at the outbreak of war joined the colours, and no more were available.

The field hospitals suffered from poverty of personnel and *matériel* even to a greater extent than the ambulances. Their work was much hampered by the absence of roads, and though intended to work as

clearing hospitals, they in fact became stationary hospitals. Bullock-wagons were the most common form of wheeled transport.

Every soldier had one or two first field dressings, and the Servians seem to have used them frequently. Many of the Bulgars, however, were too ignorant of their use to be able to apply them. M. Cousergue reflects here on the fact that the French soldier's instruction in this important department of self-aid is limited to one lecture of fifteen minutes to the newly arrived recruit. We at least with our yearly lecture to everyone from the commanding officer downwards cannot reproach ourselves with carelessness on this point. It was found by bitter experience that it was out of the question in most cases to do any thing for the wounded under fire. At Prilep, Dr. Wanovitch, of the Russian Navy, tried it, but his stretcher parties and the wounded they carried were destroyed. The wounded were able to do a great deal for themselves, and M. Cousergue avers that from 55 to 60 per cent managed to get back to medical units either by their own unaided efforts or with the help of their comrades. He relates a case in which a man, blind as the result of a penetrating wound of the skull, brought in on his back a comrade whose thigh was broken, the lame guiding the blind by means of his voice.

M. Cousergue issues one most useful warning, relating to shelter. On the plains of Turkey sepulchral tumuli abound and frequently after an action it was found that round these many men lay mortally wounded by shell fire, these conspicuous mounds having served only to attract the aim of the artillery. During pauses in the fire stretcher-bearers could work, but often had to wait till night. The Turks only had lanterns for this purpose, but outposts fired at once on every moving light. The author recommends some form of dark lantern. The problem is a difficult one. A really bright light will always be fired on, and it is useless to hope for anything else. Possibly a well-shaded candle lamp will be as useful in the long run as the best electric torch or acetylene lamp.

In general the work during an engagement seems to have been carried out very much on French lines. Nearest the front came the regimental aid post, 4,400 to 5,500 yards from the fighting line and out of artillery range. This distance is greater than that laid down by the French regulations (about 3,300 yards), and of course considerably greater than our regulations anticipate, namely, a position readily accessible to the fighting line. A great deal must depend of course on the terrain, and there is considerable difference between the undulating surface of the average English country-side and the bare open plains of Thrace or Macedonia. It is important to note this because if, as has been already stated, about half the wounded were able to find their way back to the aid posts by their own efforts, it may be hoped that perhaps as many as two-thirds or even three-quarters might be able to get back

to our more advanced stations. On the other hand it may be found that we may have to modify our arrangements, and keep our posts further back.

The ambulance was a considerable distance (*assez loin*) from the aid posts, if possible under a roof. In spite of this two such posts were captured by the Turks at Bunar-Hissar, the staff and patients being killed and mutilated. This last was not a solitary occurrence, but if all one hears is true it would be meticulous to try and differentiate between the different hues of the Serbo-Bulgarian pot and the Turkish kettle in this regard. The wounded often experienced great difficulty in finding the exact position of the various medical units, especially at night. M. Cousergue suggests illuminated indication marks; perhaps it might be possible to do something with incandescent paint. At the aid posts dressings were re-adjusted, and in a few cases (three to four per cent) fractures immobilized. Even at the ambulances but little operative interference was carried out (amputations, tracheotomies, and ligatures chiefly), only two per cent of the total number admitted being dealt with. Prompt evacuation to the nearest stationary unit was aimed at. The Greeks, however, seem to have practically immobilized their ambulances and turned them into field hospitals, keeping their cases until sufficiently recovered to stand a long journey. M. Cousergue thinks that both the Servians and Bulgarians hurried their wounded back far too quickly, and states that he saw at Sofia and Belgrade men suffering from penetrating wounds of the skull and abdomen, and septic cases, which should never have been allowed to leave the advanced field hospitals. The Greeks seem to have had the best organization for evacuation on the lines of communication. At Philippiades they had a section of an evacuation hospital (this does not appear to correspond strictly to our clearing hospital, being of a more permanent nature) which was intended to sort the wounded for further transport, retaining only those which were unable to proceed. Eventually this developed into what we should term a general hospital, but this seems to have been due largely to the personal equation of a Dr. Reverdin, of Geneva, a distinguished consulting surgeon attached to the unit. M. Cousergue tells in this connexion a story which throws so sinister a light on the seamy side of voluntary aid, that it is impossible to pass it over. I will, therefore, relate it in detail.

Briefly the story is as follows. In the neighbourhood of Philippiades numerous foreign Red Cross hospitals were established (the word "foreign" is used in this case, it must be remembered, by a Frenchman), who found their occupation gone by reason of the accumulation of the wounded in the unit just referred to. Stung by this they laid themselves out for a course of what can only be stigmatized as "body-snatching." The convoys of wounded were waylaid at the gates of Philippiades, and cases taken away to the various hospitals concerned. Then the hospitals

at Preveza raised an outcry and managed so to arrange matters that convoys of wounded should be sent direct to Preveza without touching at Philippiades. Not content with this, the different organizations posted touts at the entrance to Preveza to look out for wounded and direct them to certain hospitals. But even worse is to follow, and here I will translate M. Cousergue's own words: "The same rivalry showed itself when it came to distribution of material. The hospitals no longer applied directly for supplies to the director of medical services, who was an inconveniently good judge of their real needs, but to the exalted personages under whose patronage they were sent out. These last issued orders to which everyone had to bow, and consequently hospitals for wounded had more equipment than they needed, whilst those for medical cases (*hôpitaux des 'pathologiques'*), though crowded, could get nothing. It is true that these hospitals did not enjoy any distinguished patronage; the sick man in war is an article but little in request, whilst men slightly wounded, and allowed to be out of bed for the best part of the day, were given good beds with nice white sheets. I saw at Philippiades men suffering from cerebrospinal meningitis writhing on filthy truckle beds (*sordide gabat*) wrapped in their cloaks. The same bed linen was used for one sick man after another, and it is easy to imagine the condition these were in after such usage. As for shirts the sick had mostly to wear those they brought with them, which they had worn in some cases since the beginning of the campaign, in spite of the fact that they were crawling with vermin. At the same time some ladies of the highest social standing in Athens did their best for these men, but with the best intentions and the greatest efforts could do little in the absence of means. I do not insist on these facts, or linger over these sad sights merely to play the always easy rôle of the critic. I wish in the first place to point out the importance of not allowing the interference of any aid societies in the work of armies in the field, except under the direct and untrammelled authority of the medical service, and secondly, and most important, to protect the sick man from this unjustifiable disparagement."

The most usual method of road transport for evacuation of sick and wounded seems to have been by bullock-wagons. In a few cases the Bulgars and Greeks made use of motor-lorries, either fitted up with the Bréchot-Desprez-Ameline apparatus, or unprepared in any way. The apparatus named is a three-storied frame work for carrying three tiers of stretchers, and it was found that the patient in the topmost stretcher ran too much risk. On the other hand, if only two stories were used the rate of delivery was so reduced as to render the method not worth while, especially as vehicles of this type cut up the road very badly. The 1st and 3rd Bulgarian Armies seem to have had the worst experience. The fact that the Turks held on to Adrianople prevented the Bulgars from using the railway to the east of that town. They had therefore to send their wounded by road from Lule Burgas to Jamboli on the Tundja,

across the foot hills of the Istrandjadagh, a journey that occupied eight days. From Chataldja they were able to use the rail for the earlier and later parts of the journey, but there was an interval from Demotica to Kadikeuil which had to be traversed by road. The latter part of this, after Semenli, was apparently what the Americans call a corduroy road, made of trunks of trees covered over with earth. The heavy rain washed the earth away, and M. Cousergue describes the result as resembling a railroad of which the sleepers only had been laid down. When one remembers that the bullock-carts had no springs, and that the wheels were often polygonal, and that the wounded had to lie on straw or rushes, one realizes the ghastly tortures which they must have endured. No medical officer accompanied a convoy, which pushed on regardless of the suffering and complaints of the wounded at a rate of about twelve miles a day. The experiences of a wounded officer are thus related: "The day after I was wounded I was sent on a stretcher to Ivanceuil. No medical officer there. We spent the night in an empty house, officers rolled in their cloaks, the men in their shelter-tent pieces. Sleep out of the question. All night long one of our companions whose femur was laid bare groaned piteously. The next day we were loaded on to bullock-carts, *en route* to Kirk Kilisse, the journey taking four days. In the evenings, when we arrived at the halting place, we lay down where we could, lucky if we could get a little straw and warm ourselves before a fire. All this time nothing to eat or drink. At length we got to Kirk Kilisse, to the stationary hospital, established in an old Turkish school. There was room for 300 cases, and there were 600 of us. Many of us lay on the floor of the paved passages, the less sick wandered about the streets. There our dressings were changed and we got some warm soup, the first for several days. After two days in this paradise we were again placed in bullock-carts and sent to Jamboli, another four days on the road. That was the end of our woes. Those who could bear the fatigue of another journey, myself amongst the number, were despatched by rail to Philippopolis and Sofia."

Probably in no campaign of modern times have wounded men suffered to the extent that the soldiers of Bulgaria suffered in the campaign against the Turks. Let any one read the account of the retreat of the wounded of the Confederate Army after Gettysburg in Miss Johnston's vivid novel, "Cease Firing," and think what it must have meant when the same horrors were drawn out for over a week, and intensified a hundred fold by the nature of the transports and the condition of the roads.

Reviews.

FORMULAIRE DE THÉRAPEUTIQUE CLINIQUE. By Dr. L. Prow, Member of the Society of Therapeutics, with the collaboration of Dr. A. Cantonnet, Ophthalmologist to the Paris Hospital (Hôpital Cochin). Second Edition, Revised and Enlarged. Paris: Libraire Maloine. 1911. Pp. 527. Price 6 francs.

This handy little volume contains a great deal of information for its size, and as it only measures 6⅝ by 4⅜ inches by 1 inch can readily be carried by the busy practitioner for whom it is chiefly intended. The first 280 pages are devoted to an index of treatment, with references not only to diseases, but to certain common symptoms. The information given is in some cases necessarily brief, but the more important subjects receive greater attention. The section on the treatment of diseases of the skin is particularly good. Treatment of diseases of the eye follows, for which Dr. Cantonnet is responsible, and in the short space of forty pages he gives a good summary of the treatment which should be adopted in all the more important eye affections. Next in order is a section on the dietary treatment of certain diseases, such as diabetes, nephritis, diseases of the stomach, etc., followed in turn by a few pages dealing with organotherapy, serumtherapy, and treatment by vaccines. Other sections deal with the treatment of cases of poisoning, and analysis of urine, fæces, and gastric contents. There is also a list of compound preparations, their uses, doses, and ingredients; a list of mineral water spas, French and foreign; a list of sanatoria, besides much other miscellaneous and useful information. As will be seen from the above brief enumeration of the contents, Dr. Prou has succeeded in condensing a great many important subjects into a small space, and at the same time presenting them in an accurate and readable form. This should prove a useful little book.

O. L. R.

GUIDE TO PROMOTION FOR OFFICERS IN SUBJECTS (A) AND (B). By Major R. F. Legg. London: Gale and Polden, Ltd. Pp. xx and 160. Price 4s. net.

This book contains much information in a compact and easily accessible form. It will be found extremely useful to all engaged in company duties, and to officers on probation in the Corps.

The only objection to a book of this type is that as amendments to regulations come out, the book becomes more or less out of date.

A more detailed account of additional pay would be an advantage, and in the chapter on methods of wearing kit, etc., a list of all the articles carried by the officer and man on service would be a useful addition to the book.

K. M.

OUTLINES OF GREEK AND ROMAN MEDICINE. By James Sands Elliott, M.D., Ch.B. (Edin.) London: John Bale Sons, and Danielsson, Ltd. 1914. Pp. xii and 165. Illustrated. Price 7s. 6d. net.

This book is extremely interesting, and we can strongly recommend it to all those curious as to the origins of things—the story of early progress in medical science. Until recent years the history of the medical profession has been much neglected, and the great majority of medical practitioners are even now very ignorant of the history of the art they practise. In fact, a knowledge of the subject is not easily gained, for there

are few works on the subject which are readily accessible to the busy man There should, therefore, be an opening for Dr. Elliott's book.

It claims to be only an outline of Greek and Roman medicine, but is remarkably complete, for no prominent writer or practitioner fails to be noticed, and the author has very wisely dealt more fully with the early schools of medicine and with the leaders in medicine and surgery, such as Hippocrates, Galen, and Celsus, whose influence pervaded medical thought and practice for a thousand years or more after their deaths.

Only too often, when examined in the light of history, ideas, theories, and practice brought forth as new and original, prove to be of very ancient origin. The reader of this book will find much to justify Bacon's opinion that medicine labours "rather in circle than progression." Let us dip here and there into this story of Greek and Roman medicine. We learn that Hippocrates (460 B.C.) recommended cold sponging for fever, was able to recognize fluid in the chest by percussion and auscultation, practised paracentesis, and operated for empyema, resected the ends of bones in cases of compound fracture, used the sound for exploring the bladder, operated for fistula and piles, used a rectal speculum, and amputated at the joint for gangrene.

Ammonius Lithotomos (287 B.C.) devised the operation for crushing a stone in the bladder. Celsus, later still, performed plastic operations on the face, lithotomy, and urethrotomy. He operated for the cure of hernia, applied ligatures to arteries to arrest hæmorrhage, resected ribs for the cure of sinuses in chest walls, and amputated limbs by the circular method. He operated also for cataract and goitre. In the first century of our era Archigenes described abscess of the liver and suggested the use of opium in dysentery. In Nero's time colchicum was given for gout, and nearly six centuries before Christ, Pythagoras introduced oxymel of squill into Greece from Egypt. The discoveries of the early anatomists are given, with some account of one Herophilus, whose name is still familiar to us. The hygienist will find some account of sanitation in early Rome. Sulphur was used as a disinfectant in Homeric times, and later as a cure for some skin diseases. The virtues of physical exercise, massage, and sea bathing were recognized in very ancient times.

The army medical officer will be interested to learn that in a campaign the Roman soldier carried on his person a field dressing. Our author states that, owing to the lack of surgical knowledge in the early Roman wars, more soldiers died of wounds than were killed in battle; but later, under the Empire, he fails to note that the Roman army had a good army medical organization, with a full complement of medical officers. There is an account, however, of Machaon, the first army surgeon, and of his brother Podalicius, the first phlebotomist and army physician, who fought as soldiers before the walls of Troy.

Sufficient has been said to indicate that Dr. Elliott's book is worthy of perusal, and deserves a permanent place among our books.

H. A. L. H.

THE JOURNAL OF AN ARMY SURGEON DURING THE PENINSULAR WAR. By Charles Boutflower. 8vo. Pp. 181. Manchester: Refuge Printing Department, Strangeways. 1912.

The journal kept by Surgeon Charles Boutflower, of the 40th Regiment, during the Peninsular War has recently been published *in extenso* by his relatives. It was kept, as the writer in his opening sentence states, "at

the request of one or two dear friends," and was not meant to come under the inspection of many others. There is a great deal in the 181 pages which, from a historical point of view, might have been left out. Camp rumours in any campaign are proverbial for their inaccuracy and for their frequency, and many of these have been recorded at length, although the writer refused to give them credence.

Boutflower was interested in the inhabitants, their customs, churches, etc., and frequently records his impressions in an interesting manner. There is practically no mention of his professional work and difficulties throughout the journal. There is an occasional reference to the bad state of health of the army. For instance, on September 11, 1811, he reported that in his regiment alone the returns of sick were fifteen officers and six hundred men, but he does not state how they were accommodated or what medical staff he had at his disposal. After describing the storming of Badajos, the writer quoted his estimate of casualties, and stated that "in his regiment twenty-four officers marched off from the camp ground, of which number only six escaped"; but there is no word about dressing stations or anything medical.

Although there is nothing in the book of medical interest, it ought to form an interesting addition to the war library of the regiment to which he belonged, as he mentions the names of practically all the towns and villages in which they were billeted.

The book is not divided into chapters, but dates are given in the margin.

J. V. F.

THE FÆCES OF CHILDREN AND ADULTS: THEIR EXAMINATION AND DIAGNOSTIC SIGNIFICANCE, WITH INDICATIONS FOR TREATMENT. By P. J. Cammidge, M.D. Bristol: John Wright and Co. 1914. Pp. viii and 516. Price 17s. 6d. net.

In the preface to the present volume Dr. Cammidge states that he was asked by Messrs. John Wright and Co. to prepare and edit an English translation of Dr. Adolf Hecht's "Die Fæces aus Saüglings und des Kindes;" but that on consideration it was decided that a book of wider scope, dealing with the fæces of both adults and children, would be more generally useful. The author is to be congratulated on this decision, as in addition to material drawn from Dr. Hecht's work, and from Schmidt and Strasburger's "Fæces des Menschen," the book contains the results of his own wide experience in this particular field of work during the past fifteen years. The result has been the production of a most useful and valuable book, of interest alike to the laboratory worker and the clinician.

The volume contains ten chapters and an appendix. Chapter I deals with the collection of the fæces and their general composition and characters, and forms a suitable prelude to Chapter II, which discusses the macroscopic examination of the fæces, including gall-stones, intestinal sand, and enteroliths. Chapter III describes the microscopical examination and appearances under the microscope of the fæcal constituents, and is well illustrated with coloured and other plates. In Chapter IV, which deals with animal parasites, there is a short section on pseudo-parasites and ova that should prove useful to the inexperienced observer in enabling him to avoid the pitfalls met with in the examination of the fæces for the ova of intestinal worms, etc. Chapter V deals with the

bacteriological examination, and Chapters VI and VII with the chemical examination, of fresh and dried fæces. Chapter VIII contains an account of the methods of chemical analysis which may be necessary in order to determine the origin of intestinal calculi or concretions.

The two final chapters are of special interest to the clinician. Chapter IX discusses the diagnostic value of the examination of the stools and the characters of the fæces in the more common pathological conditions arising from disturbances of the gastro-intestinal tract. The final chapter considers the indications for treatment which examinations and analyses of the fæces suggest as the most useful in dealing with the commoner pathological conditions. The appendix contains a selection of diet schemes suitable for cases of gastric and intestinal derangement.

The book, as a whole, is very well illustrated by a number of plates and smaller figures in the text; it is clearly written, and contains much information that is not otherwise accessible in English. O. L. R.

Beriberi. By Edward B. Vedder, A.M., M.D., Captain, Medical Corps, U.S. Army, Member of the U.S. Army Board for the Study of Tropical Diseases as they exist in the Philippines. December, 1910, to April, 1913. Illustrated by numerous engravings and five coloured plates. London: John Bale, Sons and Danielsson, Ltd. 1913. Pp. viii and 427. Price 18s. net.

The recent additions to our knowledge of the ætiology and causation of beriberi render the present time opportune for the appearance of an authoritative work on the subject, which should contain the latest available information. The present work, which was awarded the Cartwright Prize of the Alumni of the College of Physicians and Surgeons, New York, is the outcome of two years' investigation and experimental study of beriberi by the author while employed as a member of the U.S. Army Board for the Study of Tropical Diseases in the Philippines. It presents a comprehensive account and critical review of the entire subject, including a survey of the evidence presented in the literature. The subject-matter is presented in sixteen chapters prefaced by a brief introduction. Chapters I and II give a historical account of the disease and its geographical distribution and prevalence, Chapter III deals with the pathological anatomy and Chapter IV with the symptomatology, containing a clear account of all the symptoms, illustrated by photographs of cases. The author prefers to describe beriberi as a single disease, considering that a division into types for descriptive purposes is apt to prove misleading; although for reasons which are given in a later chapter he inclines to the view, held by the older writers, of two distinct diseases, dry beriberi and wet beriberi. At the end of this chapter the differential diagnosis is given in tabular form. Chapter V contains an interesting and well-illustrated account of the rice grain and the different modes of preparing it for food, with special reference to the physical and chemical differences between the polished and unpolished grain. The value of the P_2O_5 content of the grain as an indicator of the amount of pericarp present is discussed, and the conclusion expressed that this is probably the best chemical indicator of the safety of the grain as an article of food. The value of this test is, however, somewhat discounted by the fact that a microscopic examination of the grain, after it has been

stained with Gram's iodine solution, will give with a little practice an equally satisfactory evidence of the safety or otherwise of the rice.

Chapters VI, VII, and VIII are taken up with a critical review of the ætiology of beriberi in the light of modern knowledge, the conclusion being reached that beriberi is a specific disease, but is not the result of infection or the action of a toxin. In Chapter IX the discussion on the ætiology of the disease is continued and this chapter is one of the most interesting and important in the book. At the commencement of the chapter the view is put forward that beriberi is caused by the deprivation of some substance which is deficient in certain kinds of food. After marshalling all the evidence, experimental or otherwise, for and against such a theory, and after a comprehensive survey of all known facts, the writer concludes there is ample evidence to prove that beriberi is caused by some deficiency in diet. The nature of the deficiency is elucidated in Chapter X, in which is given an account of the experimental work carried out by Fraser and Stanton, Eiijkmon, Schaumon, Funk, Vedder, and Clark on polyneuritis gallinorum, the work of these observers affording proof that dry beriberi in man and polyneuritis gallinorum are the same disease, and that both are caused by a dietary deficiency, namely, the absence from the food (polished rice) of the basic substance isolated by Funk from rice polishings and named vitamine by him. The term vitamine was coined by Funk to indicate a nitrogenous substance which is essential in a diet on which health may be maintained. It may be used to indicate not only the substances the lack of which is the cause of beriberi, but also the substances the lack of which is the cause of the other deficiency diseases, such as scurvy. Chapter XI records the experimental evidence which tends to prove that animal beriberi is the same disease as human beriberi and polyneuritis gallinorum. Beriberi-like diseases of animals have occurred spontaneously, or as the result of one-sided feeding, entirely apart from any experimental attempt to produce the disease, and in this chapter experiments on dogs, goats, and monkeys are recorded and show that beriberi may be caused in animals by an exclusive diet of polished rice, or by any other diet lacking in the vitamines, which are necessary for the normal metabolism of the nervous system. Chapter XII gives an excellent description of infantile beriberi, a disease first described by Hirota in 1888, and subsequently in a further communication in 1898, when he gave an exhaustive clinical description of the disease.

Infantile beriberi is an acute or chronic disease affecting infants who are being nursed by mothers suffering from the same disease. Hirota showed that all the symptoms of the infantile form are present in the adult, and that the child usually recovers if removed from the breast and given artificial food. Captain Vedder and other observers investigated the prevalence of the disease in the Philippines, where it is common among the Filipino infants. They found that the death-rate among infants was extremely high and that the mortality was greatest among the breast-fed babies, in contrast to the mortality in Europe and U.S.A., where the mortality is highest amongst artificially-fed infants. A comparative table of the symptoms in adult and infantile beriberi is given, which shows the symptoms in the two diseases to be strikingly similar. The author and Clark produced most striking recoveries in breast-fed infants by administering extract of rice polishings; no other treatment was given and the infants continued to be nursed by their mothers.

Ship beriberi is described in Chapter XIII and is defined as a disease affecting European or American crews, particularly of sailing ships, which may never have had any connexion with the countries where beriberi is endemic, and is similar to Asiatic beriberi in its symptomatology. Evidence is produced to prove the practical identity of the two diseases, both depending on the same cause, some food deficiency. Epidemic dropsy is next dealt with and its similarity to beriberi indicated.

The two final chapters are concerned with theoretical and practical considerations arising out of the matters dealt with in earlier chapters. In the first of the two the writer discusses the manner in which a diet deficiency produces the pathological changes and symptoms characteristic of beriberi, and the relationship existing between dry beriberi, wet beriberi, ship beriberi, and epidemic dropsy. Captain Vedder puts forward the view, held by the oldest writers, that dry beriberi and wet beriberi are two distinct diseases frequently co-existing in the same patient, because cases of the œdematous form can be rapidly cured by the untreated extract of rice polishings, which will not cure dry beriberi. If, however, the extract is first chemically treated (hydrolyzed) and the poisonous product developed by this product eliminated, the remainder of the extract (Funk's vitamine) produces, as a rule, prompt cure in the dry cases. The reason why dry and wet beriberi are so generally associated is apparent; both of the vitamines which respectively prevent the two diseases are present in the outside layers of grains like rice and wheat; when the grains are highly polished both vitamines are removed and if an individual exists too exclusively on those grains he will suffer from the disease. The type of disease will depend on which vitamine is most completely removed and upon the relative susceptibility of the patient, or the disease may be of the mixed type.

In the practical considerations the necessity for action by the governments concerned is pointed out and the imposition of a tax on the local production of highly-milled rice is advocated. In conclusion, Captain Vedder states that his inspiration has been the desire to present a convincing exposition of the ætiology of beriberi and a solution of the sanitary problems found in the prevention of the disease; he is to be congratulated on the success of his efforts which have resulted in the production of this excellent book. There is a copious bibliography, an index to authors, and a satisfactory subject index. The book is well illustrated and printed on good paper. All who are interested in the problems of tropical medicine should read it.

O. L. R.

Current Literature.

Salvarsan.—Taege (*Münch. med. Woch.*, June 16, 1914) describes a method of preparing sterile physiological salt solution for the preparation of salvarsan and other purposes which dispenses entirely with the use of a still or any but the simplest apparatus. He recommends it as a result of two and a half years' trial in the Freiberg skin clinique. The salt solution is made by the addition of HCl to tap water and its neutralization with caustic soda solution. Since, according to the chemical equation, 58·5 parts of NaCl are produced by the neutralization of 36·5 parts of HCl, it is easy to calculate for any strength of acid the quantity required. Thus the HCl of the British Pharmacopœia contains 31·79 per cent pure acid, and 114·89 parts of it would be required to produce 58·5 parts of NaCl, or 1·96 HCl (B.P.) for each part of NaCl. The technique is as follows: If the water contains calcium, magnesium, manganese, or iron, these are converted to their respective hydroxides by adding a few drops of one per cent phenolphthalein solution to the water and enough caustic soda solution to make the water reddish. The water is then boiled for five minutes and filtered, the insoluble hydroxides of the metals named being left on the filter. To the water thus freed of metals the necessary amount of HCl is added and the acidified water stored till required. Naturally, on account of the HCl it will remain sterile. For the manufacture of ordinary physiological salt solution such as is used before and after an injection of salvarsan the acidified water is brought to the boil, and on cooling a few drops of phenolphthalein solution added and sufficient caustic soda solution to produce the usual pink tint. For the preparation of salvarsan the acidified water is brought to the boil, allowed to cool, and the salvarsan dissolved in it. Caustic soda solution is then added till, after becoming turbid, the usual clear solution is obtained. Thus the operations of manufacturing the salt solution and neutralizing the salvarsan proceed concurrently.

Richaud and Gastaldi (*Annal. des Malad. Vénér.*, April, 1914) contest the statement of Emery that glass stills can give off lead to distilled water. The condenser of a glass still used by Sicard for the preparation of his distilled water for neosalvarsan was submitted to them for examination, but no traces of lead could be found after the most minute analysis. They point out that it is unlikely that a lead glass would give off the metal to the water since the lead is there in the form of the insoluble silicate.

Plazy (*Archiv. de Méd. et de Pharmac. Naval.*, March, April, and May, 1914) contributes a long article on the treatment of syphilis with neosalvarsan, which he used for a year in the treatment of about eighty cases. The intravenous method is preferred to others, but in two cases, where a vein could not be found, enemata of neosalvarsan were administered with good results. The technique of this method of administration was as follows: An hour before the injection the lower bowel was emptied by means of a simple enema. The neosalvarsan was made up in 100 to 200 c.c. distilled water and a little laudanum added to assist in its retention. The enema was administered with a syringe

through a Nélaton's sound, six centimetres long, introduced into the rectum. The dose and frequency of administration were the same as for intravenous injection. In one case a strongly positive Wassermann reaction became negative after 2·55 grm. had been administered in divided doses, and in another the reaction became negative after 5·25 grm. had been given in this way. With regard to dosage and frequency of administration, whichever method is chosen the author recommends caution in choice of the initial doses. He does not exceed 0·3 grm. at first, and the dose is increased only when its predecessor has been followed by no marked reaction. The injections are repeated twice weekly, and the practice of waiting six to eight days is deprecated, as neosalvarsan is excreted so much more rapidly than salvarsan. Not more than 0·9 grm. is given in any one injection and not more than 5 grm. in one month, even though the Wassermann reaction is still resistant. Not less than 4 grm. and generally about 5·4 grm. of the remedy should eventually be administered. In secondary cases it is recommended to administer a second series of injections after six months. The subsequent observation of the patient should include a monthly Wassermann test. The immediate results were good, especially in primary cases, of which twenty were treated, but the permanence of the results cannot very well be estimated; very few cases seem to have been observed for more than a few months. The same remark applies also to the secondary cases of which forty-six were treated. Five of these were suffering from nervous symptoms. Three of these lost their positive reaction between the first and fourth month and remained negative; another became negative but showed an oscillating Wassermann reaction at a later date. The fifth had a negative reaction of the blood but positive of the cerebrospinal fluid, which later became negative. In forty-one other secondary cases the Wassermann reaction became negative in two to four months, but in five cases it became later of an oscillating type. Though these cases of oscillating Wassermann reaction became spontaneously negative, it appears to the reviewer that they should be counted as relapses. On the whole, the results do not appear to be better than can be obtained with much less salvarsan when combined with mercurial treatment.

Guiard (*Annal. des Malad. Vénér.*, March, 1914) replies to the assertion of Lévy-Bing that salvarsan does not cure syphilis. He points out that in the ten cases of primary syphilis related by Lévy-Bing in which secondaries appeared within seven months of treatment the amount of salvarsan administered was much too little (1·2 to 2·4 grm.), and himself relates the histories of ten cases of primary and secondary syphilis treated, as he recommends, with six injections of 0·4 to 0·6 grm. salvarsan in seven weeks. The clinical results were good, no cases relapsing. In one case the Wassermann reaction became suspicious; in three the Wassermann test does not seem to have been applied later, and in the remainder it was negative seven to eighteen months after treatment. To emphasize the necessity of giving sufficient salvarsan, some histories of cases are related in which less than the above amount was administered and which relapsed clinically and serologically. The results of this worker and those of Lévy-Bing are interesting as both followed purely salvarsan treatment. Guiard does not believe in combined mercurial and salvarsan treatment, yet his results are no better than, if as good as, those obtained at Rochester Row with only 1·8 grm. salvarsan

and ten grains of mercury. The author has adopted Milian's recommendation to prevent reactions and dangerous symptoms by preceding the injection of salvarsan with an intramuscular injection of 1·5 mg. adrenalin. This procedure was adopted in twenty-five consecutive cases and appears to have been entirely successful in preventing reaction of any kind after the salvarsan.

Gennerich (*Münch. med. Woch.*, April 14, 1914) describes his method of treating cerebrospinal syphilis with endolumbar injections of neosalvarsan. Finding that stronger solutions caused irritative symptoms he has adopted a strength of 0·15 grm. neosalvarsan in 300 c.c. salt solution. Of this solution 4 to 6 c.c. are allowed to flow into the spinal canal from a funnel after the same amount of fluid has been removed, and also after the same amount of fluid has been allowed to flow back into the funnel and mix with the neosalvarsan solution. Not more than 4 c.c. is administered at the first injection, and injections are repeated every fourteen to twenty-one days. After each injection the patient should rest for at least two days so as to allow the puncture wound to heal up and prevent escape of fluid.

Schubert (*ibid.*) describes a modification of the above technique. He considers that it is better to dissolve the neosalvarsan in the cerebrospinal fluid itself. This obviates the difficulty of obtaining salt solution which is free from septic taint and of the required purity. He considers also that neosalvarsan is tolerated better when dissolved in the body fluids before injection. The procedure is as follows: About 10 c.c. of cerebrospinal fluid is drawn off by lumbar puncture into a sterile reagent glass. The canula is then connected through a rubber tube and a conical metal piece with a sterile glass funnel of about 10 c.c. capacity, into which cerebrospinal fluid is allowed to flow from the spinal canal. Of the fluid withdrawn at first 3 c.c. are placed in a watch-glass and in this is dissolved 0·045 grm. neosalvarsan (specially weighed by Höchster Farbwerke). Of this solution, with a 1 c.c. pipette graduated to $\frac{1}{100}$ c.c., 0·1 to 0·2 c.c. is taken and mixed with the fluid in the glass funnel, and the mixture is then allowed to flow back into the spinal canal.

Eskuchen (*ibid.*) relates the results of treating nine cases of tabes, two of cerebrospinal syphilis, and five of general paralysis by the method introduced by Swift and Ellis of injecting salvarsanized serum into the spinal canal. The technique followed was that of the original authors, with the exception that a funnel was used in place of a syringe and the remainder of the fluid was followed up with salt solution as in giving an intravenous injection by the infusion method. The amount injected varied from ten to thirty cubic centimetres of the serum, which was diluted with salt solution to make an eighty per cent, or, later, a stronger solution. Injections were given every eight days and were followed for the most part by no reaction. The subjective symptoms were markedly improved or disappeared in all cases, especially those of tabes. The objective signs, pleocytosis, globulin, and Wassermann reaction, were for the most part uninfluenced, especially the Wassermann reaction, which at the best became weaker.

Stühmer (*Münch. med. Woch.*, Nos. 14 and 20) has investigated the properties of salvarsanized serum with the object of determining how long after an injection of salvarsan it is possible to detect specific therapeutic substances in the blood serum, and also whether these substances

are products of the remedy, or antibodies. The presence of remnants of salvarsan can be detected by means of the Ehrlich-Bertheim reaction. A small quantity of paradimethylamidobenzaldehyde is dissolved in concentrated hydrochloric acid and to the solution is added a hot saturated solution of perchloride of mercury in excess. A precipitate forms which is dissolved on shaking with a few drops of the hydrochloric acid. The resulting solution gives a yellow to orange-coloured precipitate with solutions containing salvarsan or its products, the intensity of the colour depending on the concentration of the salvarsan.

The plan of the research was to inject rabbits with salvarsan and then bleed them daily for seven days. Each sample of serum was kept frozen till required for the test. It was then tested chemically and for its protective action against trypanosome infection of mice. It was found that there was a complete parallelism between the chemical and biological tests. The serum of a rabbit which had received an injection of salvarsan protected better against trypanosome infection after it had been heated at 56° C. for forty minutes than when fresh, and the heated serum also gave a markedly stronger Ehrlich-Bertheim reaction. After an intravenous injection of salvarsan 0·5 c.c. of a rabbit's serum mixed with 1·0 c.c. trypanosome blood for five minutes and then injected showed the following evidence of therapeutic substances: Unheated serum never prevented but postponed infection when drawn not later than the fifth day after the injection, while serum drawn up to the third day after injection and then heated at 56° C. for forty minutes protected against infection. Serum drawn between the third and seventh days after injection postponed infection.

After an intravenous injection of neosalvarsan the serum behaved identically whether unheated or heated. Infection was prevented with serum drawn not later than twenty-four hours after injection, and postponed with serum drawn not later than two days after injection. Samples drawn on subsequent days showed no protective action. This result may confirm the observations of some workers that in corresponding doses neosalvarsan is not so potent therapeutically as the older preparation. The behaviour of the serum after intramuscular injection was the same as after intravenous in the case of each remedy. After an intramuscular injection of Joha no protective substances could be demonstrated in the blood. The author demonstrates by a calculation that at the time it gave complete protection the serum must have contained considerably less actual salvarsan than the curative dose of salvarsan injected directly into a trypanosome-infected mouse, and concludes that the active substance must be a direct chemical product of salvarsan. The stronger protective action of heated salvarsan serum is explained by the oxidizing effect of heat on the substance in the serum. It is interesting in this connexion to recall the fact that Gennerich has remarked that salvarsan has not acted so well therapeutically since freshly distilled water has been used (and presumably oxidation has been prevented to a greater extent), and reactions have been abolished or greatly diminished.

Riebes (*Arch. f. Dermatol. u. Syph. Originale*, Bd. cxviii, March, 1914) has made a number of animal experiments to determine the fate of salvarsan and neosalvarsan after intramuscular and intravenous injection. With regard to intramuscular injection of salvarsan, he found that on an average more than sixty per cent of the injected material had

disappeared from the site of injection within twenty hours, the remainder being gradually absorbed through a longer period. The absorption of the alkaline solution was rather quicker than that of Wechselmann's emulsion. The absorption of neosalvarsan from an intramuscular depot was much quicker, only an insignificant proportion of arsenic remaining in the depot after twenty hours. In contrast to the necrosis which always follows an intramuscular injection of salvarsan, practically no change could be found in the muscle after a similar injection of neosalvarsan. He has tested for salvarsan in the urine by means of Abelin's test for the amido group, which is as follows: 5 to 7 c.c of urine is acidified with three drops of dilute hydrochloric acid and enough of a 0·5 per cent solution of sodium nitrite added (generally three drops) to cause the formation of a permanent dark spot on potassium iodide paper when a drop of the mixture is placed on it with a glass rod. Into a second glass is placed 0·3 grm. resorcin puriss. dissolved in 3 to 5 c.c. water and to it is added 2 to 3 c.c. of a 20 per cent solution of sodium carbonate. To this colourless alkaline resorcin solution the treated urine is added drop by drop. In the presence of the amido group the resorcin solution becomes red. In its absence it becomes yellow. The resorcin solution must always be freshly prepared and distinctly alkaline. The test is sufficiently delicate to detect the amido group of salvarsan in a dilution of 1 in 60,000 to 1 in 80,000. The reaction appears in the urine five minutes after an intravenous injection and disappears in the majority of cases in seven hours, though in thirteen out of sixty-five cases it was found after nine hours and in four after twelve hours. Applying the same test to the serum the reaction was found to disappear in the majority of cases in three hours One patient gave the reaction in his serum after nineteen hours and died with brain symptoms on the third day. After an intramuscular injection the urine gives the reaction from five days to two months according to various authors. The formation of secondary depots of salvarsan in the viscera is greater after intravenous than intramuscular injection. Contrary to the beliefs of many workers the author does not think these secondary depots are of any therapeutic importance but that the permanence of the effect depends on how much and for how long free salvarsan circulates in the blood. For this reason he considers that the best effects are produced by giving injections of small doses at very short intervals, such as three injections in two days. He supports his belief by the statement that spirochætes disappear no quicker from local lesions after 0·3 than after 0·6 grm. salvarsan. The clinical experience of the reviewer is against the author of this paper in his views regarding the equal therapeutic effects of 0·3 and 0·6 grm. If 0·6 grm. salvarsan effects no more than 0·3 grm. when each is given in one injection then a course consisting of 0·3 grm. salvarsan followed by five injections of mercury, etc., should be as permanent in its effects as a similar course but with an initial dose of 0·6 grm. Actually it was found at Rochester Row that a course commencing with 0·3 grm. salvarsan followed by five injections of mercury had to be abandoned very rapidly on account of the large proportion of clinical relapses which occurred before five weeks had elapsed, while a course commencing with 0·6 grm., then five weekly injections of mercury, another dose of 0·6 grm. salvarsan, five more mercury, and a final injection of salvarsan, was followed by only two clinical relapses in a large number of cases observed for a year afterwards. L. H. W.

Salvarsan-Kupfer.—Baermann (*Münch. med. Woch.*, Nr. 1, 1914) relates in a preliminary communication his experiences with salvarsan-kupfer in the treatment of amœbic dysentery, yaws, malaria, and leprosy. The preparation, which was synthetized by Ehrlich and Karrer, is salvarsan with copper anchored to the arsenic molecule. Ehrlich's introduction of this preparation at the International Congress explains its therapeutic principle: "Now it is the custom of many savage peoples, the more certainly to destroy their enemies, to smear their arrows with not one only, but two or three different poisons, so it appeared to us good to copy this custom and make our synthetic arrows not simple but double." The preparation is a fine yellowish-red powder which is put up in ampoules like salvarsan. The author found it best to dissolve it in the ampoule with a slight excess of double normal caustic soda solution (0·65 c.c. instead of 0·6 c.c. as recommended). The solution is made up to 50 c.c. with 0·7 per cent salt solution containing one per cent cane sugar. The colour of the solution when ready for injection is dark-olive green and becomes darker on exposure to air, at the same time also becoming turbid with the formation of a precipitate. The injection is made intravenously, great care being taken to allow none of the solution to escape into the tissues. The author recommends a dose of 0·1 grm. This can usually be repeated at two-day intervals, and is generally followed by no reaction, but a case of yaws which received 0·2 grm. suffered from fever for two days, with well-marked vasomotor and nervous symptoms, which, however, quickly disappeared without any after effects. The therapeutic effect on yaws, of which twenty-two cases were treated, seems to be greater than that of salvarsan. After the dose mentioned spirochætes had practically disappeared in twenty-four hours, and none whatever could be found after forty-eight hours. Pieces of tissue excised within four to fourteen days of the injection showed well-marked signs of healing, and even the severest cases healed in an extraordinarily short time. The Wassermann reaction was converted to negative in nine out of thirteen cases by a single injection, but three of these became positive at a later date.

The results with malaria were as follows: One case of quartan fever in which the blood contained schizonts and free gametes remained free from further symptoms after one dose. Four cases of tertian malaria with schizonts and free gametes in the blood remained free during a period of observation of two months after a single injection each. One case in which the blood contained large numbers of parasites, including many free gametes, showed a few schizonts after six weeks. In both these types of malaria the parasites were observed to have diminished very considerably two hours after the injection, and were found only exceptionally at the end of twenty-four hours. In two pernicious cases with small rings but no gametes there were no further symptoms during two months. In five pernicious cases with young gametes or crescents the schizonts were destroyed but not the crescents.

The effect on amœbic dysentery was disappointing.

In one case of mixed leprosy there was a marked effect on the nodules, which became much less, and ulcers healed very quickly.

At the time of writing the author was waiting for a fresh supply of the remedy before continuing his investigations.

L. W. H.

The Treatment of Syphilis by Merlusan.—In the *Militärarzt* for May 23, 1914, Stabsarzt Th. Majewski publishes the very satisfactory results he obtained in the treatment of forty cases of syphilis with merlusan. Of these cases seventeen had received no previous treatment, and the remaining twenty-three were relapses.

The drug was administered in "tabloid" form three times a day after food. Acid articles of diet were prohibited. Treatment lasted from four to six weeks, and during this period many patients put on weight. No toxic or other untoward symptoms developed. Local treatment was also given where necessary.

As with other methods of treatment a cure was not always effected with the same rapidity, but all symptoms cleared up before the course of treatment was completed. A negative Wassermann reaction was obtained in sixty-two per cent of cases at the end of the course of treatment or soon after.

The writer is of opinion that it is a great advance on any other kind of mercurial treatment, but that one will have to wait and see to what extent the cure is lasting.

The article concludes with a table giving notes on each case before and after treatment, Wassermann reactions, etc. J. V. F.

An Investigation into the Occurrence and Ætiology of Relapsing Fever in Sweden, especially in the Navy, 1788 to 1790 (O. T. Hult. Reprint from the *Nordiskt Medicinskt Arkiv*, Part II, Nos. 12 and 14).—The author begins by a short history of the Swedish naval medical service of the time, which, as in most other countries, appears to have ranked neither socially nor professionally very high. There follows a description of the actual epidemic, which appears to have been introduced into the fleet by Russian prisoners of war. Owing to the absolute lack of all knowledge of hygiene, and the frequently inadequate medical attendance, it spread rapidly, with the result that in the three years 1788 to 1790 there were in the fleet 26,147 cases with a death-roll of 5,286 or about twenty per cent. These figures are, however, admittedly only approximate, and also do not include cases among civilians and in the army. The author next gives a description of the clinical features of the disease as derived from contemporary medical reports. These are naturally, from a modern point of view, somewhat unsatisfactory. Especially do we feel the want of records of temperatures and of autopsies. By a process of exclusion, however, Hult arrives at the probably correct result that the disease was neither typhoid nor typhus, but what is now known as relapsing fever, though cases of typhus may also have occurred. He strengthens his case by records of the then prevalence of relapsing fever elsewhere in Northern Europe, especially in Russia, from where the infection in this special case is said to have been introduced. There follows a chapter on modern work on relapsing fevers. Obermeier was, of course, the pioneer; then followed Koch, Dutton, and Manteufel, and, finally, the French observers, Nicolle, Blaizot, and Conseil in Tunis. It is now usually admitted that relapsing fevers are transmitted through a bed bug or through pediculi, and Hult points out that of neither can there have been any lack in the Swedish fleet of 1788 to 1790.

A final record of what would now be called the "war diary" of a

Swedish naval surgeon of 1781 is of little importance, except as casting a light on the then prevailing conditions of the sailor's life, which were much the same as elsewhere. J. A. B.

Standardization of Bacterial Vaccines.—E. Glynn, M. Powell A. A. Rees, and G. L. Cox (*Journ. of Path. and Bacter.*, vol. xviii, No. 3, January, 1914) recommend the use of a hæmacytometer counting-chamber 0·02 millimetre deep, with a special cover-slip (Zeiss), the central part of which is thin enough to allow of the use of an oil-immersion lens, while the peripheral part is strengthened by a ring of thick glass. In this chamber, using very dilute carbol-thionin (one part saturated thionin blue in absolute alcohol with twenty to forty parts one per cent carbolic acid) as diluting fluid, nearly all the bacteria become immobilized and settle down after fifteen minutes, and can be rapidly counted both on the slide and on the lower surface of the cover-slip. They find the percentage deviation of a series of counts from their arithmetic mean is very considerably less than in Wright's, Allen's, or the plate culture methods, and their results show that by Wright's method the number of bacteria may be underestimated by as much as two hundred per cent. C. J. C.

Typhoid Bacilluria.—A. Patrick (*Journ. Path. and Bacter.*, January, 1914) has observed fifty-eight male cases of enteric fever, and found that bacilluria, visible to the naked eye, occurred in seventeen instances, commencing between the tenth day of pyrexia and the sixteenth day of convalescence. In one fatal case multiple typhoid abscesses were found in the kidneys. In six of the cases the bacilli were not typhoid, but were members of the typho-coli group, and in a series of seven cases of bacilluria in women with enteric fever the bacillus present was, in all but one case, *B. coli*. These atypical bacilli appeared in the urine, on the average, rather later than the usual date for the appearance of typhoid bacilli, persisted for quite a short time, and were unaccompanied by constitutional disturbance. They were agglutinated in varying degrees by the patient's serum, and, in one case, to a greater extent than a stock *B. typhosus*.
C. J. C.

Experimental Inoculation of Tropical Phagedænic Ulcer (*Bull. Soc. Path. Exotique*).—M. Blanchard has successfully inoculated the disease in man by placing fragments of tissue, taken from the deeper parts of an ulcer, under a point of necrosed skin produced by the application of a concentrated solution of caustic potash to normal healthy skin. *Bacillus fusiformis* and spirochætes were found in large numbers after the third day in the resulting ulcer. A similar experiment on a guinea-pig failed. C. J. C.

Treatment of Relapsing Fever with Galyl and Ludyl (*Bull. Soc. Path. Exotique*).—E. Conseil has treated at Tunis six cases of relapsing fever with galyl and four with ludyl, with uniformly successful results. These substances are arsenic compounds, discovered by Mounezrat, and were administered by intravenous injection of 0·3 to 0·5 gramme in one hundred cubic centimetres of distilled water. A single dose sufficed for each case, and caused complete disappearance of the spirilla from the peripheral blood within nine hours,

and an abrupt fall of temperature to normal. There was no recurrence of fever during the following three weeks that the cases remained under surveillance. The reaction after inoculation is stated to be slightly greater than after neosalvarsan, but less than that following inoculation of arsenobenzol. C. J. C.

Infantile Diarrhœa.—El. Metchnikoff (*Ann. Institut Pasteur*, February, 1914) discusses different views as to the causation of infantile diarrhœa, and maintains that it is microbic. Out of eight anthropoid apes fed on fæcal matter obtained from children suffering from the disease in typical form, six developed a similar diarrhœa. Experiments with young rabbits shortly after birth were also successful, and autopsies on these showed conditions closely resembling those found after infection with true cholera. Examination of the fæces of 218 human cases showed the presence of *Bacillus proteus vulgaris* in 204 instances, while among normal children it is only present in from 33 to 58 per cent. Administration of pure cultures of *B. proteus* to young rabbits caused death in 22 out of 37, but the post-mortem appearances were not typical. Infection with *B. proteus* along with *B. perfringens* (Welchii) produced a fatal diarrhœa more closely resembling the choleraic form, and the same result was obtained when coliform organisms and sarcinæ were added. He concludes that proteus is the principal organism in infantile diarrhœa, and its almost constant presence in cases of the disease, and its pathogenic rôle when administered by the mouth to animals, indicate its great importance.

In the same journal Bertrand reports that he isolated *B. proteus vulgaris* from all of fifty-five cases examined. He describes the procedure for isolation as follows: a tube of gelatine is inoculated with a small portion of the stool, liquefaction of the medium takes place in twenty-four hours, and a drop of the liquefied gelatine is then placed in the water of condensation of an agar slope. If the liquefaction has been due to *B. proteus* this organism quickly invades the surface of the medium, and after twenty-fours may be obtained in pure culture in the upper part of the tube. The sera of children suffering from attacks of infantile cholera failed to agglutinate *B. proteus*.

A. Berthelot shows that white rats which have been kept on a diet of sterilized milk partially coagulated by rennet, if given large doses of *B. proteus vulgaris* with *B. aminophilus intestinalis* by the mouth, develop in six or eight days an acute diarrhœa and die between the tenth and twentieth days. The administration of either of these organisms separately was without apparent effect except in the cases of a few very young rats which were given *B. aminophilus*. If the milk diet is changed during the earliest stages of the disease to the normal vegetable diet the animals recover. Inoculation of an etherized vaccine prepared from the mixed germs, if begun the day after the commencement of the diarrhœa, was definitely curative, even though the rats remained on milk diet and received daily doses by the mouth of the mixed living organisms. After an excessive dose of vaccine deaths occurred more rapidly than in unvaccinated animals. Still more marked was the success of the vaccine as a prophylactic. After three increasing doses at eight days' interval rats resisted attempts at infection continued for two months. C. J. C.

17

An Inquiry into the Etiology, Manifestations, and Prevention of Pneumonia amongst Natives on the Rand recruited from Tropical Areas (G. D. Maynard, F.R.C.S.E).—This paper is divided into the following sections.

(1) A consideration of the prevalence of pneumonia as influenced by race and country of birth, death-rate and attack-rate, the case mortality, and the influence of season.

(2) The clinical manifestations, course, symptoms, and gross morbid anatomy of the disease.

(3) A consideration as to whether there is any evidence that the disease is infectious.

(4) A consideration of the effect of prophylactic inoculation of a pneumo-coccal vaccine on the incidence and mortality of pneumonia.

(5) General conclusions.

Section (1).—The attack-rate and death-rate are higher among the natives recruited from the coastal area of Portuguese East Africa; these natives are of poorer physique than those recruited from Portuguese Nyassaland, Tete, and Nyassaland (B.N.P.). The prevalence of pneumonia, taking death-rate as a measure of prevalence, is greatest amongst natives during the first month of residence on the Rand.

TABLE III.

Days after arrival	Number attacked	Attack-rate per cent
0— 4	526	1·16
5— 9	389	0·86
10—14	314	0·69
15—19	275	0·61

Population exposed to risk 45,291. The liability commences suddenly and immediately after arrival and decreases subsequently from day to day.

Among 8,000 natives the attack-rate was recorded as shown in the following table:—

TABLE IV.

Month after arrival	Number attacked	Attack-rate per cent
0	312	3·89
1	203	2·58
2	155	2·0
3	139	1·83
4	125	1·68
5	89	1·22

Pneumonia amongst the natives was most common in the coldest month.

Section (2).—The clinical signs and symptoms of an uncomplicated case of pneumonia in a "tropical native" do not differ materially from those in a European. Out of 995 cases which recovered the fever terminated by lysis on 503 occasions (51·6 per cent), by crisis on 338 occasions (34·7 per cent), in the remainder the termination was atypical. Out of 1,129 natives in the W.N.L.A. compound hospital 80 had a second attack within 30 days from the termination of the pyrexial period of the first attack. The average rate of the case mortality was 39·2 per cent for first attacks and slightly lower for second attacks.

An analysis of the macroscopic post-mortem appearances in 688 cases of pneumonia showed that—

Meningitis occurred in	.. .. ..	10·47 per cent
Pericarditis ,,	.. .. ..	9·74 ,,
Empyema ,,	.. .. ..	2·76 ,,
Right lung was involved in	.. .. ..	42·61 ,,
Left ,, ,,	.. .. ..	23·6 ,,
Both lungs were ,,	.. .. ..	30·52 ,,
Lung not stated	.. ..	4·36 ,,

Section (3).—Eight thousand natives were under observation; these were given serial numbers. If the disease had spread by infection from case to case one would have expected that groups of natives with consecutive or neighbouring serial numbers would have been admitted to hospital as these groups were closely associated; this admission by groups did not occur. The figures showed that if infection from case to case played any part in determining the prevalence of the disease it must have been a small one.

In a true infectious disease (chicken-pox) this admission by groups was very marked.

Section 4.—The results of some experiments in preventive inoculation were considered from the statistical point of view.

In one experiment eight thousand natives were inoculated; these were divided into groups according to the dosage of vaccine administered.

TABLE XXXIII.

Group letter	Nature of vaccine	Dose in millions	Number in group	Mean population for six months	Pneumonia: Cases	Attack-rate per 1,000	Deaths	Case mortality per cent
B	Blood medium	250	646	613	81	132	25	31
C	,,	500	759	722	90	124	26	29
A+C	,,	600	162	158	17	108	2	12
D+H	Glucose added	1,250	157	154	22	143	3	14
G	,,	500	463	440	46	104	19	41
H	,,	1,000	650	627	69	110	17	25
I	,,	2,500	1,661	1,572	187	119	55	29
K	Blood	1,500	1,651	1,564	175	112	55	31
Q	Various	odd 200-	75	72	7	97	3	43
E	Controls ..	40,000	1,545	1,439	231	160	74	32
F	Omitted	—	354	—	—	—	—	—

A general inspection of the above table shows that the attack-rate was highest among the control group, but that the case mortality in this group was not higher than that of several of the inoculated groups.

In the first experiment, out of 5,971 inoculated, 149 cases occurred and 49 of these died; 5,689 uninoculated yielded 195 cases with 87 deaths.

In the second experiment, which is detailed in Table XXXIII, 5,922 inoculated had 694 cases and 205 deaths; 1,439 not inoculated had 231 cases and 74 deaths.

The statistical results show that whether the attack-rate or the death-rate is employed as the measure of the protection afforded by inoculation a small but definite correlation in favour of this process is observed.

Statistical tables also show that for the first two months the attack-rate amongst the inoculated is considerably lower than among the controls, but after this period there is very little evidence in favour of the protective influence of the vaccination.

There was no evidence that the larger doses provided a greater degree of protection.

There is little or no evidence that the case mortality is favourably affected by inoculation. Possibly the fatality from the disease may be reduced for a short period after inoculation. One hundred and forty-six cases were treated with doses of curative vaccine; of these 53 died: in 161 cases not so treated 49 died. So far as the results of this therapeutic experiment go there was no evidence that vaccine treatment was of any value, and in the cases in which a prophylactic dose of vaccine had been previously given there was a certain amount of evidence that actual harm resulted.

D. H.

Bacillus Typhosus in the Blood of a Healthy Carrier.—Ebeling (*Berliner klin. Woch.*, April 13, 1914, p. 689) states that a woman, a provision dealer, suffered from enteric fever in the year 1900. Since that date fourteen cases of enteric fever have been traced directly to her. Including secondary cases, she has been the source of thirty-two attacks of this disease, six of which ended fatally and in two the patients became carriers.

On every occasion when she fell under suspicion specimens of her dejecta were demanded of her. Wisely, from her point of view, she supplied the authorities with samples of her husband's excreta instead of her own.

In December last, a child with whom she had been closely associated contracted enteric fever. The woman was examined again. Blood taken from the lobe of her ear agglutinated *B. typhosus* in a 1 in 200 dilution, and *B. typhosus* was recovered from the clot inoculated into bile. Meanwhile her husband had died, and her own dejecta were investigated for the first time. *Bacillus typhosus* was discovered. The woman was quite healthy and had had no recent illness.

Five weeks later the agglutinative value of her blood had fallen to 1 in 100 and the blood clot was sterile.

Typhoid carriers in large numbers have been studied at the Strasburg Institute, where this investigation was made, for many years. This is the first occasion on which *B. typhosus* has been grown from the blood of a healthy carrier, although variations in the agglutinative power of the serum have been noted.

Ebeling suggests that a sudden rise in the agglutinative curve of a carrier may follow the entrance of *B. typhosus* into the blood-stream.

C. B.

A Boot-supporting Strap (*courroie de marche*).—In the *Archives de Médecine et de Pharmacie* for May, 1914, Médecin Principal Arnould draws attention to the *courroie de marche* or *courroie d'éclopé*, which is a strap for fixing round the instep of the boot to give more stability during long marches to men whose boots may be chafing them.

It is made of strong and pliable leather, 3 cm. broad, 3 mm. thick, and

75 cm. long. It is placed under the sole in front of the heel of the boot, crossed over the instep and passed round the boot a little above the counter of the ankle-boot, and buckled off in front of the external malleolus. It thus checks the backward and forward movement of the foot in a badly fitting boot and diminishes the tendency to blistering and excoriation of the skin. It enables men who have already got blistered feet to continue marching. Very good results have been obtained in various regiments in which it has been tried.

It differs from a similar contrivance in use in the German Army and known as a *Fuss-schoner*, which is only suitable for the long boot of the German Army.

J. V. F.

On the Treatment of Tetanus by Magnesium Sulphate (*Berliner klin. Woch.*, January 19, 1914).—Dr. H. Stadler, in an exhaustive treatise on the treatment of tetanus by magnesium sulphate, concludes his article with a series of statistical tables, the final one of which is a comparative summary of the results so far obtained by the various methods of treatment.

He says that it is still too early to state which of the three methods of symptomatic treatment will turn out best, as a sufficient number of cases have not yet come under treatment; but that one great advantage of the magnesium sulphate treatment is that it brings the patient rapid relief from pain.

COMPARATIVE STATISTICS OF THE DEATH-RATE FROM TETANUS TREATED BY VARIOUS METHODS, COMPILED FROM THE STATISTICS OF THE WRITERS BELOW MENTIONED.

Inoculation period	Without serum	With serum	With carbolic acid	With $MgSO_4$ intralumbar injections	With $MgSO_4$ subcutaneously
1 to 10 days	Kentzler 76 % Richter 95 ,,	Kentzler 52 % Jacobsen & Pease 84 ,,	Stadler 28 %	Stadler 42 %	Stadler 0 %
Total cases and average death-rate	220 cases 86 %	258 cases 67 %	54 cases 28 %	26 cases 42 %	4 cases 0 %
Over 10 days	Kentzler 44 % Richter 70 ,,	Kentzler 32 % Jacobsen & Pease 43 ,,	Stadler 6·4 %	Stadler 9 %	Stadler 0 %
Total cases and average death-rate	166 cases 59 %	186 cases 36 %	47 cases 6·4 %	11 cases 9 %	3 cases 0 %
Total	Kentzler 60 % Richter 85 ,,	Kentzler 42 % Jacobsen & Pease 70 ,,	Stadler 18 %	Stadler 33 %	Stadler 0 %
Total cases and average death-rate	386 cases 74 %	444 cases 54 %	101 cases 18 %	37 cases 33 %	7 cases 0 %

J. V. F.

Unfavourable Report on Greenleaf's Travois (*D.M.Z.*, No. 2, 1914).—Greanleaf's travois, which is illustrated in R.A.M.C. Training, pp. 174, 175, was recently tested by a battery of artillery on a march of eight hundred and forty-four miles in the Rocky Mountains. It

apparently proved itself unsuitable over long distances, the mules became exhausted, the stretcher damaged, and the patients complained of severe shaking. It has been proposed to improve the stretcher by placing small wheels at the trailing ends of the poles. A similar travois used to be shown in German first aid manuals, but has been left out in the last editions.

J. V. F.

New Honours for the German Army Medical Service.—On the occasion of the fiftieth anniversary of the foundation of the Army Medical Association in Berlin, the Kaiser has decreed that army medical officers are to be paid the same military compliments as other officers.

The senior medical officers in garrison hospitals are to have the same disciplinary powers as other officers of corresponding rank over non-commissioned officers and men employed or accommodated in the military hospitals.

Medical officers in future will wear a sash (*Feldbinde*) of a special design which is a distinguishing mark of an officer.

This has been reported in several newspapers and would appear to be the outcome of a long prevailing shortage of medical officers, which has been more felt recently with the latest increase in the strength of the army.

J. V. F.

Modern Wool used for Surgical Purposes.—In an article by Dr. W. Zänker and Karl Schnabel appearing in the *Berliner klin. Woch.*, March 2, 1914, the authors describe various impurities which are apt to creep into surgical dressings in their manufacture, and they lay down the conditions with which a good surgical wool should comply. These are:—

(1) Wool should consist of the best long-threaded, smoothed-out cotton free of any particles of shell.

(2) "Linters" (which are short-threaded waste products in the spinning of cotton), short threads, wood chips, and other by-products of cotton spinning should not be used.

(3) When a piece of wool is held against the light and pulled to pieces there should be no dust flakes or only very few.

(4) When Schwalbe's test with Fehling's solution is applied no oxycellulose should be detected, or only traces.

Schwalbe's test, which is described in the *Bericht d. deutschen chem. Gesellschaft*, 1907, p. 1347, was applied to many samples of wool purchased in the open market. The frequent reduction of the solution to red copper oxide proved that in many cases the original cellulose in the wool had been replaced by oxy- or hydrocellulose, the result of too energetic bleaching. This is acid in reaction and probably has no good effect on the healing of wounds. The power of absorption and the elasticity of the cotton threads is reduced as compared with the neutral natural cellulose. While pure cotton-wool requires only a mild bleaching process the cheaper varieties, with their impurities, will not look clean unless submitted to a much severer process.

(5) On squeezing cotton-wool which has been damped against litmus paper there should be no red reaction.

The method which the writers adopt to prove the presence of free sulphuric acid in small quantities is: Take two to three grammes of the

cotton-wool to be tested and moisten in a platinum dish and then steam on the water-bath. The wool is then squeezed in a press with a piece of litmus paper; 0·01 per cent sulphuric acid according to this process gives a definite colour reaction, while in a watery steamed extract of the cotton-wool, even with a much more sensitive litmus, no reaction is obtained. The experiment should be controlled with acid-free wool.

(6) No fat should remain in the wool after extraction in the Soxhlet apparatus. The extract should not be blue or have a bluish appearance. This would indicate the use of blue dyes.

A description of the manufacturing process at this point may not be out of place. The raw material to be cleansed is placed in a large cauldron and well boiled in a three to four per cent soda solution. By this means the cotton-wool is mercerized, i.e., it is shrunk. The very short threads of the "linters" curl up and become even shorter. During the boiling process it is customary to add a small quantity of ether solution to dissolve the fatty bodies which will not saponify. The wool is now rinsed in water and the remainder of the alkaline solution is neutralized by treating it for one hour with a one per cent hydrochloric acid solution.

The bleaching process now follows by placing the material in a solution of calcium chloride, which must be so strong that it will bleach white the chips of wood and shell in the linters and which will now only be noticeable in the wool as less thread-like particles. The wool is now washed again and neutralized, and then put into a soap bath to which a small quantity of blue colouring material is added, according to requirements, to remove the last traces of yellow coloration and to give the wool a pure white appearance. In the cheaper wools so much blue may have to be added that it retains a light blue colour. After the soap bath the wool is not rinsed again, but is treated with a very weak solution of sulphuric acid. In exceptional cases acetic acid may be used instead; latterly formic acid has also been used. This sulphuric acid bath dissolves any soap left in the wool and free fatty acids are deposited on the threads. As the strong boiling and bleaching processes have completely removed all fat from the threads and have in consequence made them very hard, this lost softness and pliability must be made good by artificial inunction. An excess of sulphuric acid, especially in the presence of free fatty acid, gives the wool the characteristic crepitating feel.

This characteristic feel has until recently been considered a mark of good wool, but this has now been disproved. An excessive amount of fat in wool is also objected to. The quality of the vegetable fats used in the preparation of the wool may often be irritating to wounds, especially when one considers what a number of neutral toilet soaps are irritating to the healthy skin. Erban has emphasized the fact that fatty acids extracted by acids from soaps are liable to further oxidation, and that where acetic acids have been used these acids and their salts are excellent breeding grounds for mildew, and that from a sanitary point of view it is very much to be desired that the crepitating feel which is insisted on on the delivery of wool from manufacturers should be done away with.

The amount of fatty acid present can be determined by placing a small quantity of wool in the Soxhlet apparatus with petrol ether. In many of their examinations the writers found, on an average, 0·36 to 0·40 per cent of free fatty acid. Link found on examination of so-called fat-free wool from 0·5 to 1·1 per cent of fat by extracting with ether.

Such a large quantity of fat materially interferes with the absorptive power of wool in the treatment of wounds.

(7) Good wool should not have a pure white appearance; it should have a yellowish tinge.

(8) Good wool meant for immediate use as a dressing should not be compressed in packets; it should be rolled in thin layers between clean paper as is already done in certain makes of American wool.

J. V. F.

The Austrian Red Cross Society's Ambulance Train in the Servo-Bulgarian War (taken from a lecture by Oberstabsarzt Dr. B. Reder, published in the *Militärarzt*, February 7, 1914).—In describing the conditions obtaining at Sofia during the war, owing to absence of the male population at the front, the lecturer stated that even the medical treatment of the civil population was in abeyance. The few civilian doctors who remained in Sofia were mainly employed in military work; cases of chronic illness got no treatment at all, and acute cases had to wait until the military requirements had been met.

Needless to say the railway system was required exclusively for military purposes, and so numerous were their requirements that the Austrian Red Cross Society's ambulance train, which was by far the best equipped train in the country, was made to stand idle for several weeks, and it was only after repeated representations on the part of the lecturer, supported from very influential quarters, that the train was eventually brought into use.

This train had already been used in the campaign against Turkey. It was composed of one passenger coach and twenty goods wagons fitted with Linxweiler apparatus, and each capable of taking eight lying-down cases. The personnel consisted of three non-commissioned officers and five men of the medical corps under the command of Oberstabsarzt Steiner, who was later succeeded by the lecturer.

The passenger coach served for the accommodation of the medical personnel and the medical equipment. As the personnel when the train was full was always engaged in the sick wagons, the passenger coach was used to convey wounded officers who could sit up. When there were large numbers of wounded to be evacuated, three to four, sometimes even more, sitting-up cases were put into each sick coach as well. As the length of the run was usually about one hundred kilometres, and the duration about six to nine hours, he found that this could be done quite safely. The train while employed transported altogether 3,565 wounded men.

The evacuation of wounded by train presents in theory and practice two very different pictures. The Bulgarian official instructions for running hospital trains were practically on the same lines as in Austrian and other European armies, and the necessary arrangements were made that there were station commandants to maintain order; there was a fixed time for the arrival and departure of trains; at certain sidings there was a medical officer running a rest and dressing station, etc. In spite of all this considerable disorganization set in.

One can hardly imagine what the congestion can be like on the arrival of several hundred wounded at a small railway station, where protection

against the weather is limited and where means of supervision are restricted. The wounded would crowd together to take advantage of any small amount of cover from sun or rain. The moment some sort of order was obtained another convoy would arrive, and the new wounded would get mixed up with the others. The many requirements of the suffering, who often had to wait many hours on the sodden ground before they could be entrained, led to backward and forward movements in the crowd and made all attempts at order and supervision of no avail. The ideal arrangement whereby the sick and wounded convoy arrives one hour before the departure of the train can seldom be counted on. A very large supply of transport, of course, will be necessary. In Bulgaria the transport was not sufficient; besides the wounded brought in on motor-wagons and ox-carts, others arrived riding on horses and pack-animals, and many crawled in supported by stretcher-bearers. To complicate matters wounded arrived at the railway station not only from the adjacent hospitals, but also from others further away and even direct from dressing stations on the field of battle; this was bound to upset any calculations.

While the wounded were very good in helping each other on the battlefield, in hospital, or in the train, the scramble to get to and into the train appears from the description to have been something like a *sauve qui peut*. There were several ways in which they fought to get into the train. Some of those who were able to get about would hide on the far side of the train and jump on to the steps at the moment the train started; some climbed on to the roof of the carriages, others waited outside the station and jumped on the moving train. Those with wounds of the lower extremities would exaggerate their condition in order to get taken on the train; some such cases, which had been carefully carried and placed in the train by the attendants, were seen getting out of the train at the next station to pick fruit off the trees.

While the anxiety of the individual to get into the train and to get to a comfortable hospital is quite comprehensible, the reason for the above described disorder was to be found in the absence of arrangements for sorting and classifying the cases before evacuating them to the railway. The best arrangements were made at Kustendil, but here also they broke down. During less than three days (June 25 to midday June 27) 18,600 wounded passed through that railway station.

The Bulgarians were mostly in defensive positions in mountainous country in the second war, so that cover for aid posts, etc., close up to the fighting line was usually available. Owing to the insufficiency of field medical units the few units available during and after fighting became only resting places for wounded. The stream of wounded in consequence poured into the line of communication hospitals by day and night without having been sorted or classified anywhere *en route*; exhaustion frequently complicated the clinical aspect of cases and the patients' own statements were often misleading.

It was an interesting fact that whenever a wounded man met a medical attendant he was insistent on having a new dressing applied. Whatever the cause was which prompted this desire it led to a lot of unnecessary handling of the wounds and to a considerable wastage of dressing material.

An attempt was made to reorganize the stream of wounded, and it was arranged that all the convoys of wounded were to be taken into

the two line of communication hospitals at Kustendil and there sorted for evacuation. Owing, however, to the shortage of medical officers this could not be done properly; the cases were sorted, but sufficient information about the nature of the wounds could not be forwarded with them. The larger of the two hospitals, through which 9,571 sick and wounded passed between the end of June and the beginning of September, never had more than four medical officers and often only two. The hospitals during the battles and on succeeding days could not cope with the congestion, so that many convoys went straight on to the railway station, and thus large numbers of wounded got evacuated into home territory whether their condition necessitated it or not. Evacuation of slightly wounded and half-cured cases into the home territory, apart from the recognized military disadvantages, is productive of a bad moral effect on the nation at large, especially if things are not going well. These are the sort of people who spread terrible tales of what they have been through, and there are plenty of people to believe them.

The rumour of the possibility of Kustendil falling into the hands of the enemy absolutely broke down any further attempt at organizing the evacuation of wounded, and a panic-stricken rush was made on the railway, so great was the fear of the wounded of falling into the hands of the enemy.

The lecturer gave a further stirring description of the misery and confusion which usually prevailed at the railway stations while the wounded were waiting for the train. The personnel was far too small to give individual attention to particular cases; they had more than enough to do unloading the bad cases out of the carts. This heavy work requires a lot of training so as to save wounded unnecessary suffering when being handled. The difference between the trained Austrian Red Cross stretcher-bearers and the others was very marked. The ground outside the station presented the appearance of a busy market-place where motors, horses and men on foot were inextricably mixed together. The confusion was made worse by the insufficiently trained stretcher-bearers whose willingness and zeal made matters worse if anything. On these occasions the want of a large and sufficient supply of uniform stretchers was very much felt. Much suffering and time would have been saved if the patients had all arrived on stretchers, or at least if sufficient stretchers had been available for them to lie on when taken out of the carts. As it was the patient was usually lifted on to a stretcher, carried to the station and placed on the ground, to be again put on a stretcher later on to be lifted into the train; the process being repeated in the reverse order on arrival at Sofia. The harrowing scenes can be readily imagined; patients with the recollection of the agony of their last shift would cry out at the sight of approaching attendants. Bad weather and dark nights gave the final touches to their misery.

The distribution of hot tea had a splendid stimulating effect on most cases. No arrangements were made for the distribution of hot food on the ten hours' run.

The medical service on the train was made difficult by the fact that there was no through communication between coaches, but as stoppages were frequent one could get from one wagon to another without waiting till the train got to the next station.

The lecturer, in concluding, emphasized the importance of preparation for war during peace, on leaving nothing to chance, and on the thorough training of all personnel. J. V. F.

Changes in the Medical Services.—In a military annual review for 1913 (*v. Löbells Jahresberichte über das Heer und Kriegswesen*, 1913, fortieth year, by Major-General v. Voss, and published by Mittler und Sohn) which deals with recent innovations in all armies, the following items appear in the medical chapter.

Invaliding: Recruiting.—Some alterations have been made in the German regulations affecting medical boards. The question of temporary or permanent disablement has no longer to be answered. The examining medical officer only states if and when another medical examination should be made.

With the increase in the strength of the German army, hernia cases are no longer rejected; minor heart affections and ear perforations are also passed for service.

Medical and Surgical Supplies.—Heat-sterilized dressings have replaced antiseptic dressings in the German army.

Boots.—With regard to the long German boot (rohrstiefel), it is stated that an English writer described it as the worst military boot. Against this an observer in the Balkan wars mentioned numerous cases of frostbite of the feet occurring in Turkish and Greek soldiers, which he attributed to interference with the circulation caused by laced boots and putties, and compared them unfavourably with the long boot worn by German and Russian troops, which in their climates cannot be beaten for simplicity and durability.

Wound-tallies.—As the outcome of the International Red Cross Congress at Washington in 1912 an attempt is being made to make the wound-tallies the same in all armies.

Ambulance dogs have been definitely introduced into the French army. They are to be trained at Fontainebleau. Six dogs are to be allotted to each bearer company.

Evacuation.—Motor ambulance wagon columns have been allotted to the German medical service. Motor supply columns on the line of communication are now also used for evacuating sick and wounded. Special motor-omnibuses for evacuation are also under consideration.

A new and lighter stretcher with collapsible handles for ambulance wagons and cavalry medical wagons has been introduced.

Voluntary Aid in Germany.—The personnel of the hospital, convoy, and depot detachments of voluntary aid has been increased, and a higher standard of knowledge of administration, Röntgen work, and management of insanes is required of them. This is the outcome of Balkan war experience. The dressing-case of the attendants has been improved.

The new uniform for delegates of the St. John's and Maltese Orders has been approved, also for superintending members of the Red Cross societies (vorstandamitglieder) who render service in war time.

The central committee of the Red Cross has published a list of articles required for rest and dressing stations to obtain uniformity.

J. V. F.

Annual Report on the Health of the Prussian Army (including the Saxony and Württemberg Army Corps) from October 1, 1910, to September 30, 1911.—This elaborate compilation of figures and statistics has recently been received, and the following data have been extracted for information :—

The admission rate per 1,000 during the year with an average strength of 554,448 was :—

To hospital	To barrack hospitals	Hospital and barrack hospital	Total	Death rate
205·3	331·7	54	591	1·9 per 1,000

The average admission and death rates per 1,000 for quinquennial periods were as follows :—

1891—96	Admissions	812·2	Deaths	2·8
1896—1901	,,	687·5	,,	2·2
1901—06	,,	610·3	,,	2·0
1906—11	,,	588·6	,,	1·8

The strength of the army, exclusive of officers, was made up of :—

81,731 N.C.Os.	with an admission rate to hospital of	403·6 per 1,000
438,928 Corporals and Privates	,, ,, ,, ,,	623·8 ,,
12,129 One-year Volunteers	,, ,, ,, ,,	846·4 ,,
* 21,660 Reservists	,, ,, ,, ,,	490·0 ,,

* This is the average daily strength of reservists doing duty.

The following table shows the actual number of men in their various years of service and the corresponding sick rate :—

	Number	Per 1,000 admitted to hospital
Men in 1st year of service	223,689	830·9
,, ,, 2nd ,, ,, ,,	206,774	433·6
,, ,, 3rd ,, ,, ,,	123,985	420·5

The highest rate of admission was in January (66 per 1,000), and the lowest in June (54·7 per 1,000).

The average constantly sick for the year was 25·1 per 1,000 = 17·8 per 1,000 in hospitals, 7·4 per 1,000 in barrack hospitals.

The average constantly sick for quinquennial periods :—

	In hospital	In barrack hospitals
1881—86	20·6 per 1,000	10·0 per 1,000
1886—1891	19·5 ,, ,,	10·5 ,, ,,
1891—96	18·9 ,, ,,	11·0 ,, ,,
1896—1901	17·7 ,, ,,	8·2 ,, ,,
1901—06	17·7 ,, ,,	7·3 ,, ,,
1906—11	17·4 ,, ,,	7·4 ,, ,,

Average number of days under treatment :—

In hospitals (includes barrack hospital treatment)	24
In barrack hospitals	8

The average length of absence from duty on account of illness for each man in the army was 9·2 days.

The admission rate by groups of diseases was :—

Skin diseases	131·1 per 1,000
Injuries	130·0 ,, ,,
Diseases of digestive organs	84·6 ,, ,,
Respiratory diseases	67·1 ,, ,,
† Venereal diseases	20·0 ,, ,,

† Highest in the 1st Saxon Army Corps, 33 per 1,000. Lowest in the Würtemberg Army Corps, 7·7 per 1,000.

DISEASES BY GROUPS.

Infectious and general diseases 35·1 per 1,000, an increase of 10 per 1,000 on last year, due chiefly to influenza.

Smallpox.—Seven cases: 98·5 per cent of the troops were successfully revaccinated.

Diphtheria.—Six hundred and forty-nine cases = 1·2 per 1,000, with twenty-seven deaths. Bacteriological diagnosis was made in all cases. Three tracheotomies were performed, but all three cases died. Of the other fatal cases seven died of heart failure, one of broncho-pneumonia and septic pleurisy, one of brain symptoms, and one of œdema of the lungs. Most cases were treated with anti-diphtheritic serum without waiting for the bacteriological report. One case was invalided as he remained a carrier after five months.

Erysipelas.—Five hundred and ten cases with five deaths.

Enteric Fever.—There were 302 cases (0·54 per 1,000) with forty-four deaths (0·08 per 1,000) = 11 per cent of cases treated. This is an increase on the previous year, the largest number falling to the 17th Army Corps in Dantzig.

By length of service cases were distributed as follows:—

100 in their 1st year of service.
146 ,, ,, 2nd ,, ,, ,,
28 ,, ,, 3rd ,, ,, ,,
28 had over 3 years' service.

Seven cases occurred in hospital attendants. In addition five men admitted to hospital for other diseases acquired enteric fever, and also an officer's servant who was working in hospital. These eleven cases constitute 3·6 per cent of the total admissions to hospital for enteric fever.

An interesting table starting from 1891 is given to show the percentage of sick attendants and other men who developed enteric fever in hospital. The figures vary from 2·7 per cent in 1909-10 to 8 per cent in 1891.

TABLE SHOWING ENTERIC FEVER INCIDENCE AND DEATH-RATE IN VARIOUS ARMIES.

PERIOD Prussia / Other countries	DISEASE INCIDENCE Prussia per 1,000	France per 1,000	Austria per 1,000	Italy per 1,000	DEATHS FROM ENTERIC PER 1,000 OF STRENGTH, AND PERCENTAGE OF CASES TREATED — Prussia Strength per 1,000	Prussia Cases treated per cent	France Strength per 1,000	France Cases treated per cent	Austria Strength per 1,000	Austria Cases treated per cent	Italy Strength per 1,000
1901-06 and 1901-05	0·79	5·1	1·9	4·6	0·09	11·5	0·68	13·4	0·26	14·1	0·83
1906-11 and 1906-10	0·45	3·9	1·8	4·4	0·06	13·3	0·53	13·7	0·25	13·9	0·83
1909-10 and 1909 ..	0·40	3·4	1·7	—	0·05	12·6	0·55	16·2	0·21	12·4	—
1910-11 and 1910 ..	0·54	2·7	1·3	—	0·08	14·6	0·37	13·3	0·20	15·4	—

The enteric incidence by months was highest in October, 0·17 per 1·000. On November it dropped to 0·02 per 1,000 and remained practi-

cally stationary till July, when it began rising again, reaching 0·11 per 1,000 in September.

With regard to sources of infection, in eight cases it was brought home to the manœuvre area; one case of a quartermaster is mentioned who took up his quarters at a farm, although he knew that a case of enteric fever had recently been there; he developed enteric fever eighteen days later. Other sources quoted are: One man infected when assisting at the burial of his father who died of enteric; infection traced to an outbreak in the civil population; infection through milk supplied by a milk seller with typhoid in his family, a large epidemic in the civil population resulting; through a potato salad, etc. etc.

Tubercle.—Admissions 1,007 = 1·8 per 1,000. Deaths 94. Returned to duty 60. The admission rate for this disease has been almost stationary since 1900. The disease manifested itself in the following ways:—

Acute miliary tuberculosis	..	18 cases	.. 0·03 per 1,000
Tubercle of lung and throat	..	757 ,,	.. 1·4 ,, ,,
,, ,, bones and joints	..	67 ,,	.. 0·12 ,, ,,
,, ,, other organs ..	..	165 ,,	.. 0·30 ,, ,,
		1,007	1·8

Dysentery.—One thousand four hundred and seventy cases = 2·7 per 1,000, a considerable increase on previous years. Most cases occurred in August and September in various training camps. No definite cause could be traced in any case. Flexner bacilli or Y bacilli were found in most cases.

Paratyphoid.—Five hundred and sixty-three cases = 1 per 1,000 with two deaths. Two epidemics were attributed to fish. In an outbreak of 186 cases in Stuttgart, three cooks were found to be paratyphoid carriers.

Heatstroke.—One hundred and ninety-six cases with six deaths; 83 cases occurred in September. This is a considerable increase on previous years, and is attributed to the hot summer.

Nervous Diseases.—Of nervous diseases the admission rate was 8·1 per 1,000, and for the quinquennium ending 1911, 7·7 per 1,000, the two preceding quinquennia being 5 and 6 per 1,000. Of the nervous diseases treated 41·8 per cent were able to return to duty.

Mental Disease.—Since 1896 mental disease appears to be on the increase, rising steadily from 0·48 per 1,000 in that year to 1·5 per 1,000 in 1911. Many cases of clinical interest are quoted in the report.

Diseases of the Circulation.—Thirteen per 1,000 is a fairly constant figure for previous years.

Venereal Disease.—The admission rate for venereal disease was 20 per 1,000. A comparative table of venereal disease in other armies is given:—

			Prussia	France	Austria	Italy	England
1881-86	and 1881-85	..	35·1	58·2	73·6	102·9	—
1886-91	,, 1886-90	..	27·1	51·1	65·3	94·3	212·4
1891-96	,, 1891-95	..	29·1	46·7	63·2	95·6	189·9
1896-1901	,, 1896-1900	..	19·8	37·4	61·5	94·0	126·9
1901-06	,, 1901-05	..	19·3	31·8	59·6	86·8	109·6
1906-11	,, 1906-10	..	19·6	29·1	55·3	77·5	70·8
1909-10	,, 1909	..	20·8	26·4	54·7	—	65·9
1910-11	,, 1910	..	20·0	26·8	55·2	—	65·5

Venereal disease was highest in the 1st Saxon Army Corps, 33 per 1,000 (including 10 per 1,000 syphilis), and lowest in the Württemberg Army Corps, 7·7 per 1,000 (including 2·8 per 1,000 syphilis).

Of those admitted to hospital:—

4,361 = 19·5 per 1,000	were in their 1st year of service.		
3,665 = 17·7	,,	,, ,, 2nd ,,	,,
3,048 = 24·6	,,	had over two years' service.	

		Average duration of treatment in hospital
64·6 per cent.	were admitted for gonorrhœa	39 days.
8·5 ,,	,, ,, ,, soft chancre and bubo	25·5 ,,
26·9 ,,	,, ,, ,, syphilis	33·8 ,,

The highest incidence was in October, the time that recruits join. If the number of men who join the service with venereal disease and the relapse cases are deducted, the ratio of first infections during the period of military service falls to 15·6 per 1,000.

Another table shows that the bigger the garrison town the larger is the ratio of venereal disease. Of the 2,981 admissions for syphilis, 351 cases relapsed once, sixty-one twice, ten thrice, one five times.

With regard to the Wassermann test, in some stations von Dungern's modification was employed. In one station the original methods and Dungern's modification were both systematically carried out, always with the same result. Stern's method was also used at Hanover. In some of the larger stations repeated Wassermann tests were carried out systematically in all cases.

Treatment by salvarsan was reported on by twenty-nine hospitals. In all 1,015 cases were treated with salvarsan. During this year the treatment by intramuscular or subcutaneous injection was generally abandoned for the intravenous method in which an alkaline solution was used. In the Berlin II district an acid solution was tried, but given up on account of unfavourable symptoms which were set up. In Strasburg 138 cases were treated exclusively with salvarsan in one or two doses of 0·6 grm. Twenty-five primary cases and five with early secondary rashes (with one exception who only received 0·4 grm.) had no relapses in the year under report, either clinically or by blood tests, but in fifty-two cases of older standing which had only received a single injection of 0·6 grm. a permanent cure was not effected. On an average, two months after intravenous and one to one and a half months after subcutaneous injection, the Wassermann reaction became positive. In about half of these cases clinical relapses occurred three to five months later.

In most of the other hospitals with a big clientele the combined treatment with salvarsan and mercury was employed; but the detail of treatment varied a good deal in the hands of the various surgeons.

Eight cases of peripheral neuritis after salvarsan were reported; auditory nerve three times, eye three times, facial nerve twice. Symptoms of cerebral irritation were reported from Berlin, Ulm, and Fitten. Most hospitals reported symptoms of fever, often with rigors, sickness, and diarrhœa after the intravenous treatment. The use of fresh distilled water towards the end of the year improved matters in most cases.

With regard to deaths after the administration of salvarsan, in one secondary case, six days after injection, jaundice developed with an increase of liver dullness, followed by enlargement of the spleen, colic, epistaxis, and increasing drowsiness. Death occurred thirty days after the onset of jaundice. At the post-mortem the liver was found to be hard, shrunken, and the right lobe hobnailed on its upper surface. There was nothing suggestive of syphilis microscopically. Another case, an under-officer,

died three days after an injection which he had received from a civil practitioner. Two days after the injection he had a fainting attack followed by intestinal catarrh. On the following day he had a severe attack of colic with loss of consciousness. These colic attacks recurred; he had thirty-three altogether in hospital lasting from two to ten minutes within eleven hours. He died that evening with symptoms of œdema of the lungs and cardiac weakness. At the post-mortem inflammation of the kidneys was determined. A third case proved fatal a few hours after treatment. There was nothing in the brain to account for the sudden death, the lungs were somewhat œdematous and the abdominal viscera somewhat congested.

Gunshot Wounds.—Three hundred and ninety-three cases occurred, of which 218 were accidents, 123 suicide, 44 were attempted suicide, 5 were inflicted in quarrels, etc., and 3 were due to self-mutilation.

At the end of the section on wounds a short chapter is devoted to describing methods of dressing, disinfection of hands and skin, administration of anæsthetics, etc., which various medical officers adopted and reported upon favourably.

Operations.—About sixty-eight pages of the report deal with brief notes on about 3,000 cases that were operated on.

J. V. F.

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Original Communications.

DESCRIPTION OF A STRAIN OF *TRYPANOSOMA BRUCEI* FROM ZULULAND.[1]

Part I.—*Morphology.*

BY SURGEON-GENERAL SIR DAVID BRUCE, C.B., F.R.S.,
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Royal Army Medical Corps,
AND
LADY BRUCE, R.R.C.

INTRODUCTION.

IN July, 1912, Dr. A. Theiler, C.M.G., Director of Veterinary Research (Union of South Africa), Pretoria, sent this Commission several blood preparations taken from horses and dogs supposed to be suffering from nagana. Much to the surprise of the Commission, a large percentage of these trypanosomes showed posterior-nuclear forms. This disposed of the contention that the so-called *Trypanosoma rhodesiense* could be distinguished from other species of trypanosomes by this peculiarity, and first led the Commission to suspect that *T. rhodesiense* was in reality *T. brucei*.

Dr. Theiler was then asked to send the living strain through to the Commission in Nyasaland, and this, after several failures, was at last successful.

[1] Reprinted from the *Proceedings of the Royal Society*, B, 1914, vol. lxxxvii.

[2] Major Harvey, R.A.M.C., resigned from the Commission and left Kasu, September 16, 1913. He was succeeded by Captain Watson, R.A.M.C., who arrived November 2, 1913.

The history of the strain is as follows: Mr. A. W. Shilston, Veterinary Research Division, Pietermaritzburg, writes that it originated in a mule which was naturally infected at Somkele, in Zululand. A dog was inoculated from this mule and brought to the Veterinary Research Laboratory at Pietermaritzburg, where sub-inoculations into a series of animals were made. Mr. Shilston says there is no possibility of this strain having been mixed with any other, as, at the time he was working at it, it was the only species of trypanosome maintained at the laboratory. He also states that he—in order to prove that he was dealing with a single species of trypanosome and not with a mixed infection—infected rabbits with single parasites, and the resulting infections showed the same morphological characters as the original strain.

From Pietermaritzburg the strain was transferred to Pretoria. Mr. William Robertson, Acting Director during the absence on leave of Dr. Theiler, informs the Commission that the strain was kept going in Pretoria in horses and cattle, in which animals it produced the typical clinical symptoms and post-mortem lesions associated with nagana, and that it was always regarded as a pure uncomplicated strain of *T. brucei*. The thanks of the Commission are due to Mr. Robertson for his perseverance in sending inoculated animals to their camp at Kasu. Like the Japanese general outside Port Arthur, as one batch succumbed he sent on another, until at last he succeeded.

The exact length of time this trypanosome was kept going at Pretoria before being sent to Kasu is not given, but the information has been asked for, and will be placed on record as soon as obtained.

In the opinion of the Commission, the trypanosome dealt with in this paper is the same as that discovered by Bruce in Zululand in 1894, and named *T. brucei* by Plimmer and Bradford. Somkele is in the same district in Zululand as that in which this species of trypanosome was first discovered.

In this paper the old Zululand strain will be called the 1896 strain, that being the year in which it was first described; the new strain, the 1913 strain, the year in which it was received from Pretoria.

The Zululand trypanosomes were described by Bruce in his original paper[1] as hæmatozoa which vary among themselves a good deal in size and shape. Photographs were also given which show a distinct dimorphic type. In a later paper[2] Bruce gives measure-

[1] "Further Report on the Tsetse-fly Disease, or Nagana, in Zululand," 1896.
[2] *Proc. Roy. Soc.*, B, vol. lxxxiii, p. 9 (1910).

ments of 200 trypanosomes taken from preparations which had been made in Zululand in 1896, and also gives six figures taken from the same source. From these it will be seen that the trypanosome dealt with in Zululand in 1896 was a markedly dimorphic form, with long and slender, intermediate, and short and stumpy forms. From the above measurements and figures there cannot be the slightest shadow of doubt about this.

In 1896 Bruce sent this trypanosome to England, and it was at once placed in the hands of Kanthack, Durham, and Blandford by the Royal Society to be reported on. Their investigation lasted two years, and was published in vol. lxiv of the *Proceedings of the Royal Society*. In regard to the shape of this trypanosome they state that "the nagana parasites vary considerably both in size and form; they may be long and pointed or blunt-ended and somewhat stouter; some individuals are short and thick, with a short flagellum, their protoplasm being crowded with rounded granules." No one who reads Bruce's "Progress Report" and compares it with Kanthack, Durham, and Blandford's 1898 report can doubt that the same trypanosome was being dealt with. This trypanosome was distinctly dimorphic.

About this time (1898) the trypanosome was handed over to Bradford at the Brown Institute and named *T. brucei* in a paper written in 1899.[1]

That the trypanosome named by Plimmer and Bradford was the same as that sent to Kanthack, Durham, and Blandford in 1896 there can be no reasonable doubt. There was no other species of pathogenic trypanosome in any English laboratory at the time, with the exception, perhaps, of *T. lewisi*, with which there could be no confusion.

Now, having shown that the original Zululand strain was a well-marked dimorphic type of trypanosome, let us see how it compares with the 1913 strain.

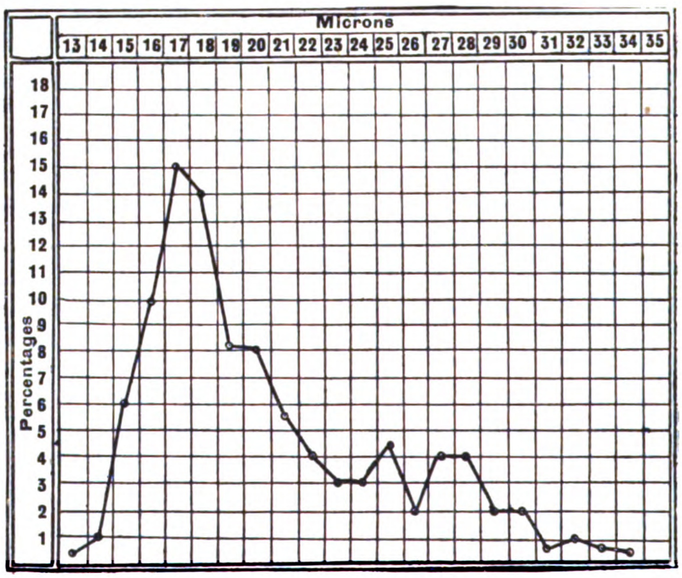
Mr. Shilston kindly sent the Commission a description of this strain made immediately after it had come from Zululand. He states that in the living condition the variation in size and shape of the organism can be observed, the long, slender flagellated forms being readily distinguished from the short, stumpy forms, while all gradations between these two can be found; that the circular

[1] "A Preliminary Note on the Morphology and Distribution of the Organism found in the Tsetse-fly Disease," by H. G. Plimmer and J. Rose Bradford, *Proc. Roy. Soc.*, vol. lxv, p. 274.

vacuole close to the micronucleus is very distinct; and that, although the organisms are actively motile, their progression is not rapid and frequently they simply travel in a small circle.

Mr. Shilston also made a large number of measurements of this strain. One of his charts gives the percentages in respect to length of 400 trypanosomes occurring in the mule, dog, and guinea-pig, the measurements being made at varying periods of the disease. This chart is reproduced below.

CHART 1.—Curve representing the Distribution, by Percentages, in respect to Length, of 400 Individuals of *T. brucei*, Zululand Strain, 1913 (Shilston's measurements).



In a previous paper[1] a curve will be found representing the percentages in respect to length of 200 individuals of the original strain of *T. brucei*, measured from old Zululand preparations which had been made in 1896 and were still extant. The numbers making up these two curves are doubtless small, but they are fairly comparable.

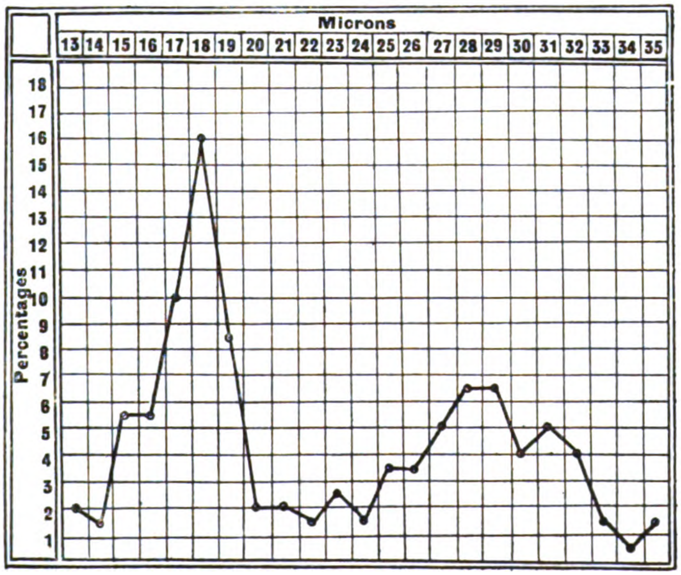
Now although too much weight must not be placed on this comparison, still it must be confessed that the two curves are remarkably alike, and afford a strong argument that Shilston recovered from the Somkele district of Zululand the same species

[1] *Proc. Roy. Soc.*, B, vol. lxxxiii (1910).

of trypanosome which had been discovered there in 1894. Again, when the action of these two strains on various animals is compared, the same likeness is seen.

Bruce's 1896 strain killed two horses in thirty and forty-nine days.[1] Shilston's 1913 strain killed one horse in thirty-five days. The former strain killed five dogs in an average of twenty-one days, the latter four dogs in an average of nineteen days.

CHART 2.—Curve representing the Distribution, by Percentages, in respect to Length, of 200 Individuals of *T. brucei*, Zululand Strain, 1896.



Taking these various arguments into consideration, it may be assumed that the strain of trypanosome which forms the subject of this paper belongs to the species, *T. brucei*, a well-marked dimorphic type of trypanosome.

The object of this paper is to describe as fully as possible the morphology of this new strain of *T. brucei* from Zululand, in order to try to prove its identity with the trypanosome causing disease in man in Northern and Southern Rhodesia, Nyasaland, and German and Portuguese East Africa. The importance of this cannot be overrated. It has been the habit in the past to consider *T. brucei* harmless to man, but if the above conjecture proves to

[1] "Further Report on the Tsetse-fly Disease, or Nagana, in Zululand," 1896.

TABLE I.—MEASUREMENTS OF THE LENGTH OF *T. brucei*, ZULULAND, 1913.

Date	No. of expt.	Animal	Method of fixing	Method of staining	In microns		
					Average length	Maximum length	Minimum length
1913							
Feb. 10 ..	1833	Monkey ..	Osmic acid	Giemsa	21·4	27·0	16·0
,, 10 ..	1835	,, ..	,,	,,	23·2	29·0	18·0
,, 10 ..	1836	,, ..	,,	,,	23·4	30·0	18·0
,, 10 ..	1837	,, ..	,,	,,	21·9	31·0	17·0
,, 13 ..	1834	,, ..	,,	,,	20·3	28·0	16·0
,, 13 ..	1835	,, ..	,,	,,	19·0	24·0	12·0
,, 13 ..	1836	,, ..	,,	,,	20·1	28·0	16·0
,, 17 ..	1834	,, ..	,,	,,	20·6	27·0	17·0
,, 20 ..	1904	Dog ..	,,	,,	22·8	29·0	19·0
,, 20 ..	1905	,, ..	,,	,,	20·5	29·0	17·0
,, 20 ..	1907	,, ..	,,	,,	20·6	28·0	17·0
,, 20 ..	1908	,, ..	,,	,,	20·7	30·0	18·0
,, 24 ..	1904	,, ..	,,	,,	25·1	31·0	19·0
,, 24 ..	1905	,, ..	,,	,,	21·1	25·0	18·0
,, 24 ..	1907	,, ..	,,	,,	20·0	30·0	16·0
,, 24 ..	1908	,, ..	,,	,,	21·2	25·0	18·0
,, 27 ..	1904	,, ..	,,	,,	21·7	30·0	18·0
,, 27 ..	1905	,, ..	,,	,,	21·8	31·0	18·0
,, 27 ..	1906	,, ..	,,	,,	20·8	28·0	18·0
,, 27 ..	1907	,, ..	,,	,,	19·1	21·0	16·0
,, 27 ..	1908	,, ..	,,	,,	24·8	32·0	18·0
,, 24 ..	1844	Guinea-pig	,,	,,	27·6	35·0	18·0
,, 24 ..	1894	,,	,,	,,	21·0	29·0	18·0
,, 27 ..	1843	,,	,,	,,	21·9	29·0	17·0
,, 27 ..	1894	,,	,,	,,	21·2	31·0	17·0
,, 8 ..	1829	Rat ..	,,	,,	22·9	28·0	17·0
,, 8 ..	1829	,, ..	,,	,,	22·5	28·0	18·0
,, 8 ..	1829	,, ..	,,	,,	21·5	26·0	18·0
,, 9 ..	1829	,, ..	,,	,,	21·6	25·0	17·0
,, 9 ..	1829	,, ..	,,	,,	20·9	25·0	18·0
,, 9 ..	1829	,, ..	,,	,,	20·7	24·0	17·0
,, 10 ..	1829	,, ..	,,	,,	21·2	24·0	19·0
,, 10 ..	1829	,, ..	,,	,,	21·6	23·0	19·0
,, 10 ..	1829	,, ..	,,	,,	21·3	24·0	17·0
,, 11 ..	1829	,, ..	,,	,,	19·8	25·0	17·0
,, 11 ..	1829	,, ..	,,	,,	20·5	22·0	18·0
,, 11 ..	1829	,, ..	,,	,,	20·9	25·0	18·0
,, 12 ..	1829	,, ..	,,	,,	20·6	23·0	18·0
,, 12 ..	1829	,, ..	,,	,,	21·7	28·0	18·0
,, 12 ..	1829	,, ..	,,	,,	21·3	25·0	19·0
,, 13 ..	1829	,, ..	,,	,,	20·5	23·0	18·0
,, 13 ..	1829	,, ..	,,	,,	20·0	24·0	17·0
,, 13 ..	1829	,, ..	,,	,,	20·2	23·0	17·0
,, 14 ..	1829	,, ..	,,	,,	20·6	26·0	18·0
,, 14 ..	1829	,, ..	,,	,,	19·5	23·0	17·0
,, 14 ..	1829	,, ..	,,	,,	20·0	22·0	17·0
,, 15 ..	1829	,, ..	,,	,,	20·4	23·0	18·0
,, 15 ..	1829	,, ..	,,	,,	19·7	24·0	17·0
,, 15 ..	1829	,, ..	,,	,,	20·2	22·0	18·0
,, 16 ..	1829	,, ..	,,	,,	19·6	22·0	18·0
					21·0	35·0	12·0

be true, then all *Glossina morsitans* areas where wild game and *T. brucei* co-exist must be looked upon as dangerous. Evidence is accumulating that this is so. Recently two Europeans have fallen victims to the tsetse-fly disease in the Sebungwe district in Southern Rhodesia, a remote, savage, unfrequented spot swarming with game and *G. morsitans.* This year also—1913—as had been anticipated, several cases have been found in the Nyasaland fly-areas to the north and south of the "Proclaimed Area," one case occurring in a native village within a few miles of Zomba, the official capital.

In future papers, the Susceptibility of Animals to this Strain, its Development in *G. morsitans,* Sera Reactions and Cross Inoculation Experiments will be dealt with.

I. Morphology of T. brucei, Zululand Strain, 1913.

A. *Living, Unstained.*

In the living and unstained preparations the dimorphic characteristics of this species can be readily made out. The parasites are actively motile but with restricted translatory movement.

B. *Fixed and Stained.*

The blood films were fixed, stained and measured as previously described in the *Proceedings.*[1]

Length.—The preceding table gives the length of this trypanosome as found in the monkey, dog, guinea-pig and rat, 1,000 trypanosomes in all.

The average length of *T. brucei,* Zululand strain, 1913, in the monkey, dog, guinea-pig, and rat, taken from Table I, is as follows :—

TABLE II.—Average Length of *T. brucei*, Zululand Strain, 1913.

Species of animal	Number of trypanosomes measured	In Microns.		
		Average length	Maximum length	Minimum length
Monkey	160	21·2	31·0	12·0
Dog	260	21·5	32·0	16·0
Guinea-pig	30	22·9	35·0	17·0
Rat	500	20·8	28·0	17·0

The above table shows that a good deal of difference in growth takes place in different animals. Compare, for example, the guinea-

[1] B, vol. lxxxi, pp. 16 and 17 (1909).

TABLE III.—DISTRIBUTION IN RESPECT TO LENGTH OF 500 INDIVIDUALS OF *T. brucei*, ZULULAND STRAIN, 1913.

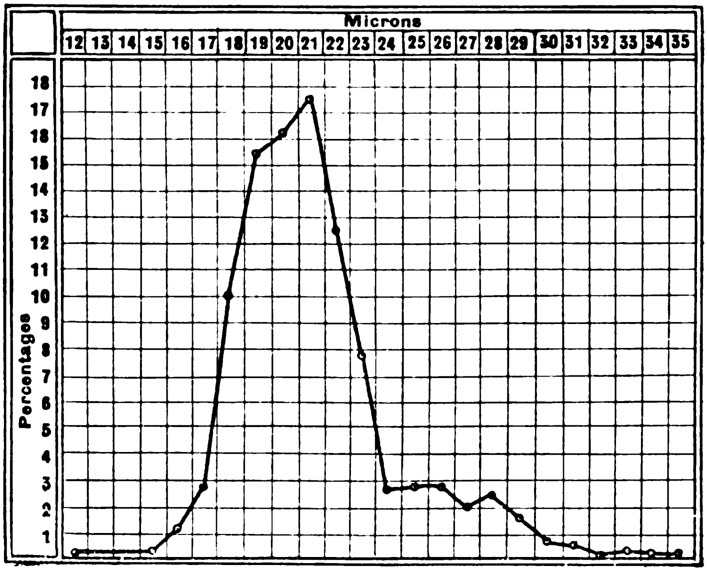
Animal	In Microns																								Average length
	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	
Monkey		—	—	—	1	—	4	2	1	1	2	4	2	2	—	1	—	—	—	—	—	—	—	—	21·4
,, ..	—	—	—	—	—	—	1	2	2	4	1	2	1	1	1	1	2	2	—	—	—	—	—	—	23·2
,, ..	—	—	—	—	—	—	2	2	1	1	3	—	1	3	5	—	1	—	1	—	—	—	—	—	23·4
,, ..	—	—	—	—	—	1	1	2	3	4	4	1	—	1	1	—	—	1	—	1	—	—	—	—	21·9
,, ..	—	—	—	—	4	—	1	2	1	4	6	1	—	—	—	—	1	—	—	—	—	—	—	—	20·3
,, ..	1	—	—	2	1	1	1	5	3	2	3	—	1	—	—	—	—	—	—	—	—	—	—	—	19·0
,, ..	—	—	—	—	3	1	2	6	2	1	1	—	—	2	—	1	1	—	—	—	—	—	—	—	20·1
,, ..	—	—	—	—	—	2	—	5	4	5	1	—	1	—	1	1	—	—	—	—	—	—	—	—	20·6
Dog	—	—	—	—	—	—	—	2	2	5	1	5	1	—	—	2	—	2	—	—	—	—	—	—	22·8
,, ...	—	—	—	—	—	4	5	3	1	1	1	1	—	—	2	—	1	1	—	—	—	—	—	—	20·5
,, ...	—	—	—	—	—	2	4	—	2	6	3	2	—	—	—	—	1	—	—	—	—	—	—	—	20·6
,, ...	—	—	—	—	—	—	3	3	2	2	—	3	—	—	1	3	2	—	1	—	—	—	—	—	20·7
,, ...	—	—	—	—	—	—	—	3	1	1	1	1	1	—	2	3	2	3	1	1	—	—	—	—	25·1
,, ...	—	—	—	—	—	—	2	2	3	5	4	2	1	1	—	—	—	—	—	—	—	—	—	—	21·1
,, ...	—	—	—	—	1	2	4	2	4	2	3	1	—	—	—	—	—	—	1	—	—	—	—	—	20·0
,, ...	—	—	—	—	—	—	2	4	3	1	2	6	—	2	—	—	—	—	—	—	—	—	—	—	21·2
,, ...	—	—	—	—	—	—	2	4	6	1	1	—	2	—	1	1	1	—	1	—	—	—	—	—	21·7
,, ...	—	—	—	—	—	—	1	6	3	2	4	—	—	—	—	1	2	—	—	1	—	—	—	—	21·8
,, ...	—	—	—	—	—	—	3	6	4	2	—	—	3	—	1	—	1	—	—	—	—	—	—	—	20·8
,, ...	—	—	—	—	1	1	4	6	5	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19·1
,, ...	—	—	—	—	—	—	2	3	2	—	1	—	—	1	2	1	1	3	2	1	1	—	—	—	24·8
Guinea-pig ..	—	—	—	—	—	—	1	1	—	—	—	2	1	—	1	1	4	2	1	2	—	2	1	1	27·6
,, ..	—	—	—	—	—	—	2	6	5	4	—	—	—	—	—	1	—	2	—	—	—	—	—	—	21·0
,, ..	—	—	—	—	—	1	5	2	1	—	2	3	—	—	4	—	1	1	—	—	—	—	—	—	21·9
,, ..	—	—	—	—	—	1	4	5	2	2	1	—	1	1	—	1	—	—	1	1	—	—	—	—	21·2
Rat	—	—	—	—	—	1	—	1	2	2	3	4	1	2	1	2	1	—	—	—	—	—	—	—	22·9
,, ...	—	—	—	—	—	—	1	2	1	3	4	2	2	2	2	—	1	—	—	—	—	—	—	—	22·5
,, ...	—	—	—	—	—	—	2	1	3	6	3	1	1	2	1	—	—	—	—	—	—	—	—	—	21·5
,, ...	—	—	—	—	—	1	1	2	1	3	4	5	1	2	—	—	—	—	—	—	—	—	—	—	21·6
,, ...	—	—	—	—	—	—	1	3	5	3	6	1	—	1	—	—	—	—	—	—	—	—	—	—	20·9
,, ...	—	—	—	—	—	1	—	3	3	8	4	—	1	—	—	—	—	—	—	—	—	—	—	—	20·7

Rat	—	—	—	—	—	—	—	1	6	6	3	2	2	—	—	—	—	—	—	—	—	—	—	—	21·2
,, ...	—	—	—	—	—	—	—	1	1	6	8	4	—	—	—	—	—	—	—	—	—	—	—	—	21·6
,, ...	—	—	—	—	—	1	1	—	2	4	9	2	1	—	—	—	—	—	—	—	—	—	—	—	21·3
,, ...	—	—	—	—	—	1	2	6	5	5	—	—	—	1	—	—	—	—	—	—	—	—	—	—	19·8
,, ...	—	—	—	—	—	—	1	3	6	5	5	—	—	—	—	—	—	—	—	—	—	—	—	—	20·5
,, ...	—	—	—	—	—	—	1	3	6	5	1	2	—	2	—	—	—	—	—	—	—	—	—	—	20·9
,, ...	—	—	—	—	—	—	3	4	2	5	1	5	—	—	—	—	—	—	—	—	—	—	—	—	20·6
,, ...	—	—	—	—	—	—	1	2	4	4	3	3	—	1	1	—	1	—	—	—	—	—	—	—	21·7
,, ...	—	—	—	—	—	—	—	2	5	4	4	4	—	1	—	—	—	—	—	—	—	—	—	—	21·3
,, ...	—	—	—	—	—	—	3	2	2	10	1	2	—	—	—	—	—	—	—	—	—	—	—	—	20·5
,, ...	—	—	—	—	—	1	4	4	2	5	2	1	1	—	—	—	—	—	—	—	—	—	—	—	20·0
,, ...	—	—	—	—	—	1	3	3	5	2	4	2	—	—	—	—	—	—	—	—	—	—	—	—	20·2
,, ...	—	—	—	—	—	—	2	2	6	5	3	1	—	—	1	—	—	—	—	—	—	—	—	—	20·6
,, ...	—	—	—	—	—	2	6	2	3	5	1	1	—	—	—	—	—	—	—	—	—	—	—	—	19·5
,, ...	—	—	—	—	—	1	1	5	5	6	2	—	—	—	—	—	—	—	—	—	—	—	—	—	20·0
,, ...	—	—	—	—	—	—	2	3	8	1	4	2	—	—	—	—	—	—	—	—	—	—	—	—	20·4
,, ...	—	—	—	—	—	2	2	5	6	3	—	1	1	—	—	—	—	—	—	—	—	—	—	—	19·7
,, ...	—	—	—	—	—	—	2	5	4	5	4	—	—	—	—	—	—	—	—	—	—	—	—	—	20·2
,, ...	—	—	—	—	—	—	5	4	5	5	1	—	—	—	—	—	—	—	—	—	—	—	—	—	19·6
Total	1	—	—	2	11	28	100	153	161	175	125	79	27	28	28	20	24	17	9	7	1	2	1	1	..
Percentages ..	0·1	—	—	0·2	1·1	2·8	10·0	15·3	16·1	17·5	12·5	7·9	2·7	2·8	2·8	2·0	2·4	1·7	0·9	0·7	0·1	0·2	0·1	0·1	..

pig with the rat: the former with a maximum of 35 microns, the latter with a maximum of only 28 microns.

The preceding table gives in detail the distribution in respect to length of 1,000 trypanosomes. The Commission feel hardly justified in taking up space for this purpose, but it is thought that perhaps in some unknown way these figures may be of use to the statistician.

CHART 3.—Curve representing the Distribution, by Percentages, in respect to Length, of 1,000 Individuals of *T. brucei*, Zululand Strain, 1913.



This curve is made up of measurements from 160 specimens of trypanosomes taken from the monkey, 260 from the dog, 80 from the guinea-pig, and 500 from the rat. It is very similar to some of the curves taken from the Nyasaland human strain;[1] compare Strains II and V. But, on the other hand, it is very unlike some of the others, as for example Strains I and II.

Chart 4 is rather a peculiar curve, but is not unlike curves obtained in a similar way from the trypanosome causing disease in man in Nyasaland, as Chart 5 will show.

The Zululand strain, 1913, has been carried on in horses and cattle for some time in the laboratory at Pretoria, and may have varied somewhat in morphology under these artificial conditions.

[1] *Proc. Roy. Soc.*, B, vol. lxxxvi, pp. 285-302.

CHART 4.—Curve representing the Distribution, by Percentages, in respect to Length, of 500 Individuals of *T. brucei*, Zululand Strain, 1913, taken on nine consecutive days from Rat 1829.

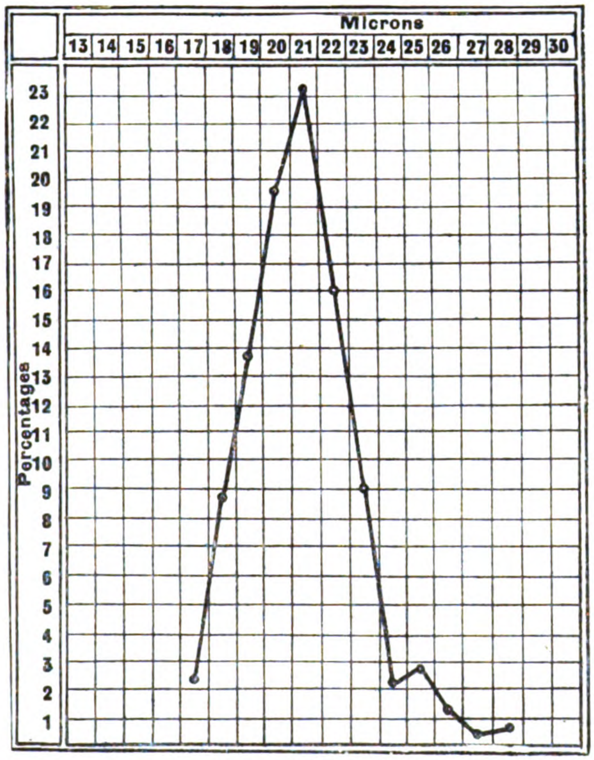


CHART 5.—Curve representing the Distribution, by Percentages, in respect to Length, of 500 Individuals of the Trypanosome causing Disease in Man in Nyasaland, taken on nine consecutive days from Rat 2300.

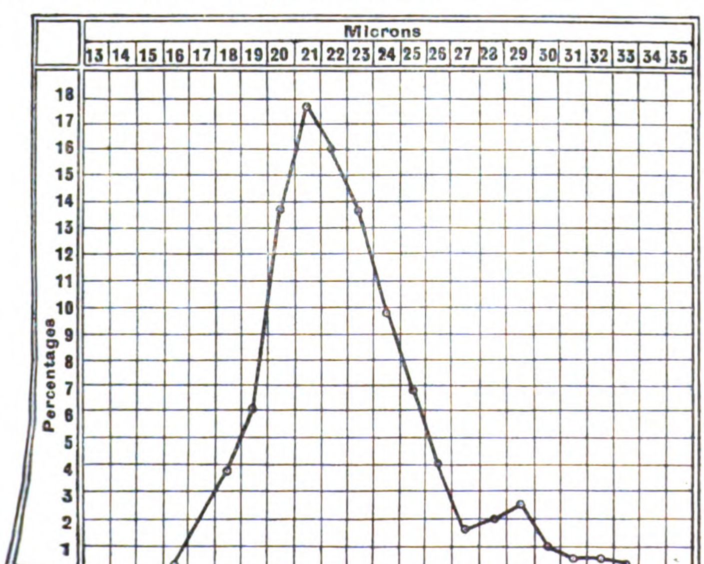


CHART 6.—Curve representing the Distribution, by Percentages, in respect to Length, of 500 Individuals of *T. brucei*, Zululand Strain, 1913, after first passage through *G. morsitans*, taken on nine consecutive days from Rat 2006.

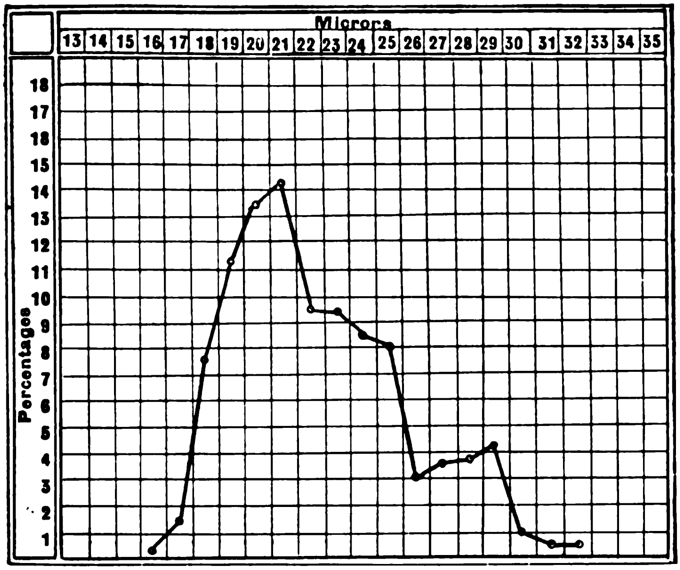
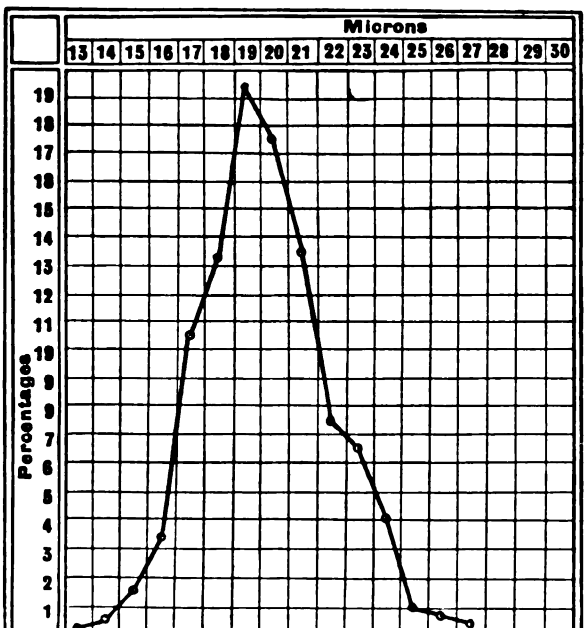
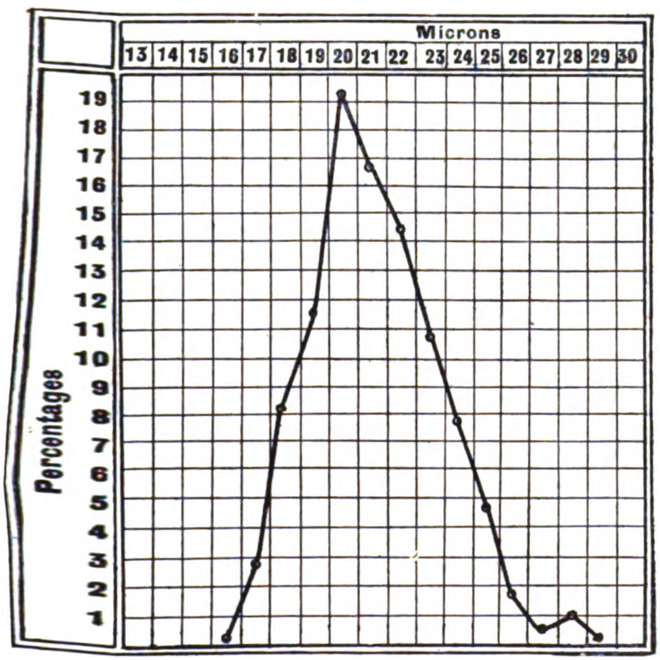


CHART 7.—Curve representing the Distribution, by Percentages, in respect to Length, of 500 Individuals of *T. brucei*, Zululand Strain, 1913, after second passage through *G. morsitans*, taken on nine consecutive days from Rat 2288.



It will be interesting to see what change, if any, is induced by passage through *G. morsitans*. Charts 6, 7 and 8 represent first, second and third passages.

CHART 8.—Curve representing the Distribution, by Percentages, in respect to Length, of 500 Individuals of *T. brucei*, Zululand Strain, 1913, after third passage through *G. morsitans*, taken on nine consecutive days from Rat 2406.



From this curve it will be seen that three passages through *G. morsitans* has had little or no effect in changing the character of this trypanosome as regards distribution of length. It has usually been thought that a trypanosome kept under laboratory conditions, and without the opportunity of passage through its invertebrate host, the tsetse-fly, would tend to change in morphology. These curves, on the other hand, show that a trypanosome, after passage through horses and cattle for some years—exact time unknown—is unchanged by three passages through its invertebrate host, *G. morsitans*.

TABLE IV.—DISTRIBUTION IN RESPECT TO LENGTH OF 500 INDIVIDUALS OF *T. brucei*, ZULULAND STRAIN, 1913, AFTER FIRST PASSAGE THROUGH *G. morsitans*.

Animal	In microns																	Average length
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
Rat ..	—	1	1	5	—	2	1	1	4	1	—	2	—	2	—	—	—	22·5
,, ..	—	—	—	1	3	—	4	3	1	3	—	1	3	—	1	—	—	23·8
,, ..	—	1	3	—	1	4	2	4	1	1	1	—	1	1	—	—	—	22·1
,, ..	—	—	3	—	5	2	3	3	1	2	—	—	—	1	—	—	—	21·7
,, ..	—	1	1	1	2	6	3	1	4	—	—	—	1	—	—	—	—	21·4
,, ..	—	—	2	—	3	6	4	2	2	1	—	—	—	—	—	—	—	21·4
,, ..	—	—	—	3	4	4	2	2	1	1	—	1	1	—	—	—	1	22·3
,, ..	—	—	3	1	8	3	—	1	1	2	—	1	—	—	—	—	—	21·0
,, ..	—	—	3	3	5	1	2	2	—	—	—	2	—	2	—	—	—	21·7
,, ..	—	—	2	2	1	—	1	2	2	1	1	—	2	4	2	—	—	24·6
,, ..	—	—	—	3	3	1	1	—	2	4	1	—	1	2	—	1	1	24·1
,, ..	—	—	1	2	—	1	—	3	4	4	1	1	1	2	—	—	—	24·0
,, ..	—	—	2	4	1	1	4	—	2	3	—	2	—	—	1	—	—	22·4
,, ..	—	—	1	1	1	1	2	2	5	3	2	—	—	1	—	1	—	23·7
,, ..	—	—	1	1	1	2	2	3	3	3	2	1	—	1	—	—	—	23·3
,, ..	—	2	2	2	1	3	1	3	2	1	—	2	—	1	—	—	—	21·9
,, ..	—	1	3	1	2	3	4	—	—	4	—	—	2	—	—	—	—	21·8
,, ..	—	—	2	3	2	5	1	5	—	1	—	1	—	—	—	—	—	21·3
,, ..	—	—	1	5	4	5	1	—	—	—	2	1	—	1	—	—	—	21·4
,, ..	1	—	1	1	3	3	2	4	1	1	—	—	2	1	—	—	—	22·3
,, ..	—	—	1	5	1	4	2	1	3	—	1	—	1	1	—	—	—	21·9
,, ..	—	—	1	4	5	4	1	2	—	1	—	1	1	—	—	—	—	21·3
,, ..	—	—	1	2	3	5	2	2	1	1	1	1	—	1	—	—	—	22·1
,, ..	—	—	—	1	4	4	3	1	2	2	1	—	1	—	1	—	—	22·7
,, ..	—	1	3	5	4	1	—	—	1	—	2	1	2	—	—	—	—	21·3
Total ..	1	7	38	56	67	71	48	47	43	40	15	18	19	21	5	2	2	
Percentages	0·2	1·4	7·6	11·2	13·4	14·2	9·6	9·4	8·6	8·0	3·0	3·6	3·8	4·2	1·0	0·4	0·4	

TABLE V.—DISTRIBUTION IN RESPECT TO LENGTH OF 500 INDIVIDUALS OF *T. brucei*, ZULULAND STRAIN, 1913, AFTER SECOND PASSAGE THROUGH *G. morsitans*.

Animal	In microns															Average length
	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
Rat ..	—	—	—	—	1	2	—	5	4	2	3	2	1	—	—	21·1
,, ..	—	—	—	—	2	—	4	3	3	1	4	2	—	2	—	21·0
,, ..	—	—	—	—	1	2	2	3	2	1	2	4	1	1	—	21·7
,, ..	—	—	—	—	1	3	4	5	4	2	1	—	—	—	—	19·9
,, ..	—	—	—	—	2	2	9	3	3	1	—	—	—	—	—	19·3
,, ..	—	—	1	—	3	2	5	5	4	—	—	—	—	—	—	19·0
,, ..	—	—	1	3	4	—	5	1	2	1	1	1	1	—	—	19·1
,, ..	—	—	1	—	5	2	2	4	4	1	—	—	—	—	1	19·3
,, ..	—	—	—	2	—	2	5	3	2	4	2	—	—	—	—	19·9
,, ..	—	—	—	2	1	3	3	5	3	—	2	1	—	—	—	19·6
,, ..	—	—	1	—	2	3	5	5	3	—	—	—	—	—	1	19·4
,, ..	—	—	—	1	3	4	1	3	4	2	1	—	—	1	—	19·7
,, ..	—	2	1	3	4	3	2	2	2	1	—	—	—	—	—	17·7
,, ..	1	—	—	1	2	4	6	3	—	—	3	—	—	—	—	18·9
,, ..	—	—	1	1	6	5	3	3	—	—	1	—	—	—	—	18·1
,, ..	—	—	—	2	3	5	2	3	1	2	1	1	—	—	—	19·1
,, ..	—	—	—	—	2	1	7	5	4	1	—	—	—	—	—	19·5
,, ..	—	—	—	—	4	3	4	4	3	—	1	1	—	—	—	19·4
,, ..	—	—	1	1	3	3	3	2	5	1	1	—	—	—	—	19·1
,, ..	—	—	1	—	—	2	5	5	—	6	1	—	—	—	—	20·0
,, ..	—	—	—	—	—	1	7	5	3	1	1	2	—	—	—	20·3
,, ..	—	—	—	—	1	2	4	5	2	2	2	2	—	—	—	20·4
,, ..	—	—	—	—	2	2	2	1	4	5	3	—	1	—	—	20·8
,, ..	—	—	—	—	1	3	2	2	3	3	1	4	1	—	—	21·1
,, ..	—	—	—	1	—	7	5	3	2	—	2	—	—	—	—	19·2
Total ..	1	2	8	17	53	66	97	88	67	37	33	20	5	4	2	
Percentages	0·2	0·4	1·6	3·4	10·6	13·2	19·4	17·6	13·4	7·4	6·6	4·0	1·0	0·8	0·4	

TABLE VI.—Distribution in respect to Length of 500 Individuals of *T. brucei*, Zululand Strain, 1913, after third passage through *G. morsitans*.

Animal	In microns														Average length
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
Rat ..	—	—	1	2	3	2	5	4	2	1	—	—	—	—	21·6
,, ..	—	—	3	1	3	5	3	—	2	3	—	—	—		21·3
,, ..	—	1	1	—	3	6	3	4	—	2	—	—	—	—	21·4
,, ..	—	—	2	1	2	6	1	4	2	—	1	—	1	—	21·8
,, ..	—	—	1	1	1	3	3	5	4	2	—	—	—	—	22·3
,, ..	—	—	2	2	5	2	2	3	2	—	1	1	—	—	21·5
,, ..	—	—	—	3	5	8	2	1	1	—	—	—	—	—	20·8
,, ..	—	1	1	4	5	2	3	2	1	1	—	—	—	—	20·7
,, ..	—	1	1	3	2	7	3	1	1	—	—	—	1	—	21·0
,, ..	—	2	—	3	4	1	5	4	1	—	—	—	—	—	20·8
,, ..	—	—	1	3	6	4	2	2	2	—	—	—	—	—	20·8
,, ..	—	—	1	1	3	4	2	5	2	1	1	—	—	—	21·9
,, ..	—	—	1	4	2	1	1	2	3	5	1	—	—	—	22·3
,, ..	1	—	3	3	3	—	4	3	—	1	1	—	1	—	21·1
,, ..	—	—	1	2	2	1	8	1	3	1	—	—	—	1	22·1
,, ..	—	2	1	1	7	3	2	2	1	1	—	—	—	—	20·6
,, ..	—	—	2	2	4	6	3	1	—	1	—	1	—	—	21·0
,, ..	—	—	3	3	8	1	1	—	2	—	1	—	1	—	20·8
,, ..	—	1	1	5	4	1	2	1	2	2	1	—	—	—	21·1
,, ..	—	1	3	3	2	4	3	3	1	—	—	—	—	—	20·5
,, ..	—	1	4	3	5	2	1	2	—	2	—	—	—	—	20·3
,, ..	—	—	3	1	5	4	4	—	2	—	—	—	1	—	21·0
,, ..	—	2	1	1	5	2	4	2	1	1	1	—	—	—	21·1
,, ..	—	2	3	3	1	4	4	1	2	—	—	—	—	—	20·4
,, ..	—	—	1	3	6	5	1	1	2	—	1	—	—	—	20·9
Total ..	1	14	41	58	96	84	72	54	39	24	9	2	5	1	
Percentages	0·2	2·8	8·2	11·6	19·2	16·8	14·4	10·8	7·8	4·8	1·8	0·4	1·0	0·2	

Chart 9.—Curve representing the Distribution, by Percentages, in respect to Length, of 2,000 Individuals of *T. brucei*, Zululand Strain, 1913, taken on nine consecutive days from Rats 1829, 2006, 2288, and 2406.

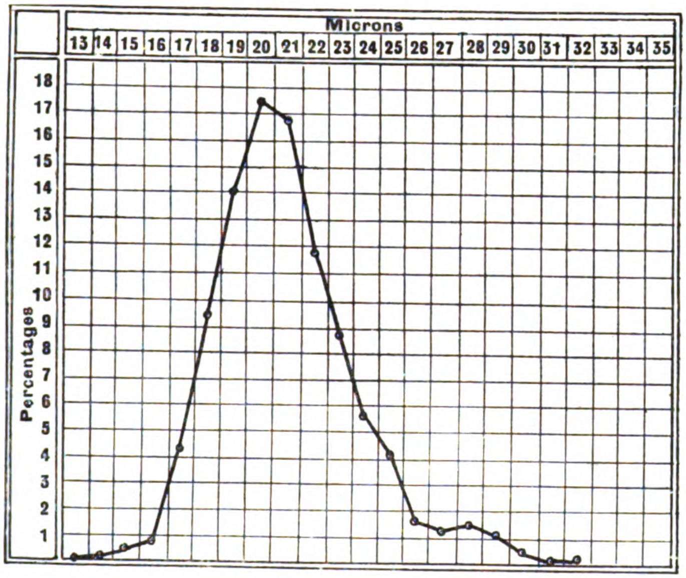
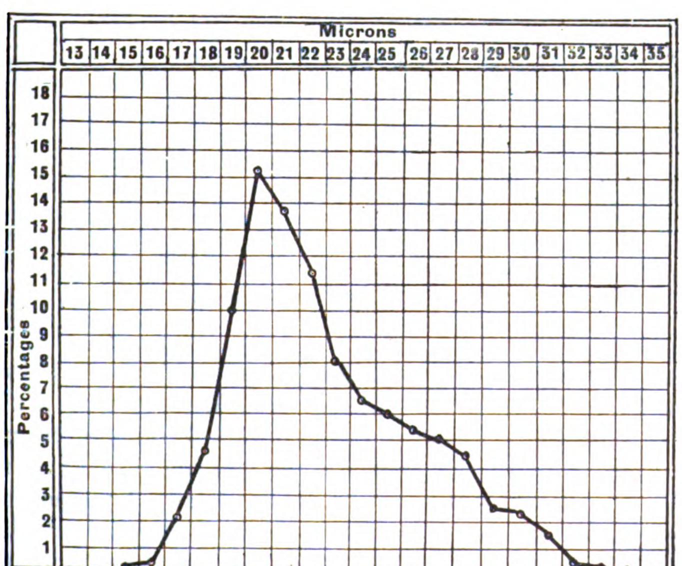


Chart 10.—Curve representing the Distribution, by Percentages, in respect to Length, of 2,500 Individuals of the Trypanosome causing Disease in Man in Nyasaland, the Wild-game Strain, taken on nine consecutive days from Rats 847, 1220, 992, 849, and 1022.



As Shilston's mule was in all probability infected from the wild game of the Somkele district, in Zululand, it will be interesting to compare this curve with that of the trypanosome causing disease in man, taken from the wild game in Nyasaland.

TABLE VII.—PERCENTAGE OF POSTERIOR-NUCLEAR FORMS FOUND AMONG THE SHORT AND STUMPY VARIETIES OF *T. brucei*, ZULULAND STRAIN, 1913.

Date	Experiment No.	Animal	Percentage among short and stumpy forms
1912			
June 22	I	Horse	30
,, 25	II	,,	65
—	I	Dog	5
June 21	II	,,	*Nil*
1913			
Feb. 8	1828	Rat	1
,, 9	1828	,,	37
,, 10	1828	,,	63
,, 11	1828	,,	36
,, 12	1828	,,	32
,, 13	1828	,,	17
,, 14	1828	,,	54
,, 15	1828	,,	45
,, 16	1828	,,	20
,, 17	1828	,,	17
Mar. 24	2006	,,	10
,, 25	2006	,,	54
,, 26	2006	,,	41
,, 27	2006	,,	18
,, 28	2006	,,	38
,, 29	2006	,,	32
April 1	2006	,,	69
Mar. 2	2006	,,	74
,, 3	2006	,,	63
,, 7	2006	,,	74
July 21	2288	,,	*Nil*
,, 22	2288	,,	42
,, 23	2288	,,	20
,, 24	2288	,,	35
,, 25	2288	,,	16
,, 26	2288	,,	29
,, 27	2288	,,	43
,, 28	2288	,,	52
,, 29	2288	,,	49
,, 30	2288	,,	61
—	I	Mouse	5
		Average	37·8

Charts 9 and 10 are undoubtedly much alike, and as the wild-game strain in Nyasaland is supposed to be identical with the human strain, then it might be said that *T. brucei*, Zululand strain, 1913, is also identical with the trypanosome causing disease in man in Nyasaland. Others will say that the Zululand trypanosome and the Nyasaland wild-game strain are both *T. brucei*, but that this does not prove that *T. brucei* is identical with the human strain.

No, but if it is shown that *T. brucei*, Zululand, is absolutely identical in morphology with this Nyasaland human strain, that it also has exactly the same disease-producing power on the various experimental animals, this will go a good long way to make the ordinary unprejudiced man chary of exposing himself too carelessly to the so-called harmless nagana. His serum may save him as a rule, but there may come a time when—his resistance being lowered either by fatigue or some other cause—the trypanosome may gain a footing, and then his belief in the written word of the textbook will receive a rude shock.

Breadth.—The long and slender average 2·76 microns in breadth, the intermediate 3·25, and the short and stumpy 3·53. This measurement was made across the broadest part of the trypanosomes and includes the undulating membrane. Most previous measurements of breadth have not included this.

In regard to the shape of this trypanosome, contents of cell, nucleus, micronucleus, undulating membrane, and flagellum, it is not proposed to describe these characters separately for this strain as was done in the case of the trypanosome causing disease in man in Nyasaland. Suffice it to say that, after the most careful comparison, no difference whatever can be made out in the morphology of the two trypanosomes.

Conclusions.

(1) The trypanosome described in this paper under the name of the "Zululand strain, 1913," is the same species as that discovered by Bruce in Zululand in 1894; reported on by Kanthack, Durham and Blandford in 1898; and named *T. brucei* by Plimmer and Bradford in 1899.

(2) As regards its morphology, this trypanosome is absolutely identical with the trypanosome causing disease in man in Nyasaland, the *T. rhodesiense* of Stephen and Fantham.

BACTERIOLOGICAL EXAMINATION OF WATERS IN THE FIELD.

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Introduction.

In the last edition of his work on "The Examination of Waters and Water Supplies," Dr. Thresh expresses the opinion that, in considering the results of water examinations, "standards may be useful to the beginner and the inexperienced, but are carefully to be avoided by the expert and experienced."

That this view is generally held by experts is painfully obvious to the tyro who, having with much tribulation worked out certain results, refers to the works of the accepted authorities to discover what indications those results may be considered to afford. Amid the quicksands of uncertainty a small rock of dogma to which an opinion might be anchored would be a welcome discovery, even though it were a dogma open to dispute.

It is further remarked that "during the last few years certain methods of examination have obtained general acceptance and now discussions chiefly arise upon the interpretation of results." This being so, surely sufficient data must shortly be available to justify an attempt to base upon them certain definite standards—however provisional—which would meet the demand of the beginner for some guiding light from the experience of the expert.

Every contribution to the mass of recorded data must therefore prove useful, if only by drawing down a contradiction from higher authority which voices the doctrine of the Scotch divine that "We are none of us infallible, not even the youngest." The only *sine qua non* is that the work should be careful and the results comparable.

For the medical officer to wait for ripe experience in the matter of examination of water supplies on active service before being justified in expressing an opinion upon such results as are obtainable would be a modesty as fatal as false, and a duty rests upon the sanitary officer to attempt in peace times to formulate standards which will prove of value when he is called upon, possibly for the first time, to undertake his duties with an expeditionary force.

There is, therefore, a pressing need that every opportunity should be taken which manœuvres afford for the determination both of the means of bacteriological examination which are applicable to field service conditions and the standards of potability of water supplies which should be adopted from a study of the results thus obtainable.

With due diffidence I have complied with a request to record some results obtained during a recent reconnaissance of the water sources in a manœuvre area, a duty which afforded opportunities such as are not available to civilian medical officers of health. The exceptional nature of the opportunities may be thus summarized :—

(*a*) Provision of a motor-car for visiting four hundred and ninety-three towns and villages in a limited area within a month and inspecting the sources of water supply.

(*b*) Facilities for getting made the necessary equipment for a limited bacteriological examination of waters and provision of trained assistance and all media required for such examinations. These facilities enabled careful and comparable data to be obtained with regard to two hundred and eighty-nine waters sampled, from which two thousand two hundred and sixty-four tubes were inoculated.

It is precisely with such sources of water supply that the expeditionary force will be concerned, in all probability, when next called upon to take the field, and it is with regard to such sources that the least assistance in the formulation of bacterial standards will be available from civilian observations. Work upon similar lines would rapidly result in the collection of a mass of data which would be available for the information of those upon whom will fall the duty of evolving standards for our guidance upon active service.

This investigation may be considered under the following heads :—

(*a*) The objectives.

(*b*) The methods.

(*c*) The results and their indications with regard to formulation of bacterial standards.

(*d*) The applicability of these methods and standards to active service conditions.

A.—The Objectives.

The health of troops on active service is so closely dependent upon the purity of water that special importance must attach to

consideration of all means which will assist medical officers whose duty it is to select the sources of supply and to see that they are not subsequently polluted. Such considerations must retain that importance until such time as a wholly satisfactory means of water sterilization has been evolved for field service.

The increasing value—both relative and actual—of bacterial examinations of water clearly indicates the advisability of adopting any method calculated to give sufficiently valuable information as to justify the necessary addition to equipment, and to give such information rapidly enough to be of practical use, i.e., within a maximum of certainly not more than twenty-four hours.

It is at once evident that a full bacterial examination, aiming at the *isolation* of any fæcal indicator, is impracticable for this purpose, both on account of the mass of material and the length of time required. It therefore remains to determine:—

(1) If there be any simple and rapidly workable modification which is capable of giving valuable information as to the probable safety of water supplies.

(2) If such modified methods can be made applicable under field service conditions.

(3) The standards by which the purity of water may be gauged from the data thus obtained.

B.—The Methods adopted.

(*a*) *The Examinations conducted.*

(1) *Lactose-fractors.*—The essential aim of all bacterial water examinations is, of course, to determine whether, and to what extent, excretal organisms are present. Isolation of *Bacillus coli* being, as already noted, impracticable in the field, the alternative is, therefore, to ascertain to what extent organisms are present which afford strong presumptive evidence of an excretal origin, and the type selected was that of organisms fermenting lactose in bile-salt broth (MacConkey) at blood-heat in twenty-four hours.

While the presence of organisms of so large a group cannot be regarded as conclusive evidence of excretal pollution, their absence from small quantities of a water is sound evidence that there can be no massive pollution by sewage; this investigation has therefore a certain positive and a very considerable negative value. The fact that laboratory research has been dominated by the attempt to recover from water definite organisms of undoubted fæcal origin by no means indicates that valuable information may not be obtainable

from the reactions of the large group of associated organisms. Proof was sought of the presence of organisms of this group in amounts ranging from 20 c.c. down to $\frac{1}{2}$ c.c.; the total amount of each water examined amounted to 50 c.c. and the results were expressed in terms of the minimal number of cubic centimetres containing lactose-fractors. The amounts actually taken for each water were 20, 15, 10, 5, 2, 1, and $\frac{1}{2}$ c.c.

In view of the fact that it is usual to inseminate several tubes with similar amounts of water, it was anticipated that the use of only one tube for each amount would produce irregular readings and lead to consequent difficulty in accepting the results. In practice we were agreeably surprised to find that this was not so; in roughly eighty-five per cent the readings were "clean," i.e., there were no positive tubes interspersed among negatives, or vice versa. Possibly this was due to the fact that thorough mixture of the sample was ensured prior to insemination of the tubes. Waters which gave all positives or all negatives in their series of tubes presented some difficulty, owing to the end-point not having been reached. With only seven tubes in each series and the comparative purity of the water an unknown quantity, it was impossible to take amounts which ensured the end-point being included. As it was felt to be unfair to wholly exclude these results, those giving all negatives were recorded as having fractors in 75 c.c. instead of 50 c.c., while the all-positive results were given a value of fractors in $\frac{1}{4}$ c.c. instead of $\frac{1}{2}$ c.c.

In order to correct errors due to this cause or to wide individual variations from the mean (as illustrated by serial numbers, six of Class 2 springs and thirty-eight of Class 2 wells) the ten per cent highest and the ten per cent lowest readings were eliminated from the records of each group and averages were struck for the remaining observations. The total and the corrected averages are both tabulated for comparison and will be dealt with later.

A control was carried out to determine to what extent the twenty-four hour incubation results were liable to modification by longer incubation. It was found that very few tubes giving a negative result in twenty-four hours gave a positive result subsequently.

(2) *Total Organisms.*—This datum affords an index to the general bacterial purity; the efficiency of filtration of water reaching wells and springs; and, therefore, to the liability to massive pollution.

The total organisms growing on agar at blood-heat in twenty-

four hours were counted. The agar was carried in test-tubes and melted by the spirit lamp. After cooling to the appropriate temperature, as determined by touch, 1 c.c. or less of the water —according to the probable count—was added and thoroughly mixed before the agar set. This method was much more convenient than working with Petri dishes and gave good results. High counts were more easily made if the agar was remelted after incubation, for the resulting opacity of the colonies gave assistance and uniform distribution could be secured by gentle inversion. A control proved that the readings were not thus increased by breaking up of colonies as was thought possible.

(3) *Nitrites.*—Owing to the facts that the results of chemical analysis need to be interpreted by their co-relation, and that a full analysis is out of the question, the only simple chemical test which is applicable is that for nitrites. This was made in every case, but the fact that only two positive reactions were obtained in two hundred and eighty-nine examinations, many of which were obviously of very foul waters, suggests that the test is not worth applying as a routine. One positive was obtained at a point where a sewer discharged into a small stream, and the other was from a well which had an over-full closet pail and an overflowing refuse pit within ten feet of the well-mouth.

The time occupied in collecting samples and inseminating tubes at the well-mouth is six minutes.

(*b*) *Observations made.*

(1) *Re Sources.*—All available particulars as to the water sources were noted, and the individual sources were classified according to the opinion formed on the spot as the result of inspection. The classification adopted was :—

Springs, Class 1.—Those with outcrop and intake areas adequately protected.

Springs, Class 2.—Those not thus adequately protected.

Wells, Class 1.—Pump wells, adequately protected by covering, coping, wet-staining, enclosure, etc.

Wells, Class 2.—Pump wells, inadequately protected but having no obvious source of pollution within the danger zone.

Wells, Class 3.—Wells with inadequate protection and having some obvious source of pollution within the prescribed zone. Rivers, brooks, canals and catchment areas were not classified.

(2) *Re Rainfall.*—In the hope of getting some light upon the

effect of recent rain upon the quality of these waters, daily notes were made as to the length of time since rain fell. The results for each class have been subdivided according as there had been rain :—

(1) Within twenty-four hours.
(2) Within forty-eight hours but not within twenty-four hours.
(3) Not within forty-eight hours.

It is regretted that this subdivision necessarily led to there being so few results in some of the subdivisions as to prevent general deductions being drawn as to the effect of rainfall in modifying the applicability of the general standards worked out.

(c) *Apparatus and Daily Routine.*

These will be considered together when discussing their applicability to active service conditions.

C.—Results obtained.

The best control of the value of these methods would obviously be that of a full bacterial examination of the same waters, but the time—many weeks—and expense involved make such a control impossible. The only alternative control is that afforded by comparison of the results obtained with the opinions formed from inspection of the sources. If there be a general accord the value of these methods may be considered to be established, and it was this consideration which largely led to adoption of the classification indicated.

If, however, there were too close a relation between the results obtained and the opinions formed from inspection of the sources, it might be argued that mere inspection should suffice and that the extra equipment and the work needed for bacterial examination are superfluous. This objection would be met if there were sufficiently wide individual divergencies from the group averages to indicate that the results obtained afford a more definitely reliable basis than simple inspection for an opinion as to the safety—relative or actual—of water from any given source.

The results obtained are given below in summarized tabular form, followed by the detailed data whence they have been worked out :—

TABULAR SUMMARY OF RESULTS IN GROUP AVERAGES.

Rainfall			Number examined	Count	Lactose fractors	Count	Lactose fractors	Count	**Lactose fractors**
Springs	Class I	Within 24 hours	21	124 *70**	24 *20·8*				
		,, 48 ,,	7	89	27	84 *53*	31·6 *30·0*		
		Nil in 48 ,,	23	46 *38*	40 *40·2*			123 *73*	**23·1**
	Class II	Within 24 ,,	18	180 *77*	17·5 *12·7*				
		,, 48 ,,	6	245	9·5	170 *98*	12·8 *9·1*		
		Nil in 48 ,,	18	136 *97*	9·8 *7·2*				
		Total ..	93						
Wells	Class I	Within 24 hours	4	14	51				
		,, 48 ,,	2	9	30	28 *25*	47·6 *49·8*		
		Nil in 48 ,,	25	31 *29*	48·5 *50·5*				
	Class II	Within 24 ,,	17	99 *88*	5·2 *5·1*				
		,, 48 ,,	9	50 *41*	10·3 *6·1*	87 *70*	7·0 *4·9*	142 *99*	**12·8** ***11·7***
		Nil in 48 ,,	27	92 *66*	7·0 *5·6*				
	Class III	Within 24 ,,	34	160 *116*	3·6 *2·8*				
		,, 48 ,,	15	239 *169*	1·8 *1·2*	213 *141*	4·3 *2·6*		
		Nil in 48 ,,	42	247 *165*	5·6 *3·3*				
		Total ..	175						
Brooks and rivers			11	..	..	..	..	308	**5·2**
Canals			4	..	..	..	..	1,466	**·2**
Open catchment areas			6	..	..	..	..	816	**29·7**
		Grand total ..	·289 waters examined.						

(* Italics indicate corrected figures.)

Notes.

(1) Class I springs are those with outcrop area adequately protected. Class II springs are those with outcrop area inadequately protected.

(2) Class I wells are those adequately protected. Class II wells are those inadequately protected, but with no obvious source of pollution within the danger zone. Class III wells are those inadequately protected and having an obvious source of pollution within the danger zone.

(3) The count represents the total colonies per cubic centimetre growing on agar in twenty-hours' incubation at 37° C.

(4) The lactose-fractor figures represent the minimum amount in cubic centimetres of the water, which contains organisms fermenting lactose in bile-salt broth in twenty-fours hours' incubation at 37° C.

(5) Rainfall within forty-eight hours indicates that rain has fallen within that period, but not within twenty-four hours.

(6) The corrected data are those obtained after deducting from the records of each group the 10 per cent highest and 10 per cent lowest readings and re-averaging for the remainder.

Springs.

Class I. With intake area adequately protected.

Serial No.	Colonies per c.c. growing at 37° C.	Minimal number of c.c. containing lactose fractors	Notes
			(a) Rainfall within 24 hours of sample being taken (21).
1	226	50	Piped supply from an impounded spring, feeding a reservoir.
2	11	50	Impounded main spring, with free flow.
3	0	75	Council supply, pumped from an impounded main spring.
4	32	50	Free flow from main spring, bricked over.
5	87	10	Piped supply from impounded main spring.
6	180	1	Piped from impounded main spring.
7	160	2	,, ,, ,,
8	1	2	Full stream fed by spring. Piped terminally. Outcrop fenced in field.
9	70	25	Piped from impounded main spring.
10	8	10	,, ,, ,,
11	17	10	,, ,, ,,
12	104	5	,, ,, ,, Extra fencing around outcrop.
13	694	5	Impounded main spring from rock in hill with houses close above.
14	40	1	,, ,, from hill-side below houses.
15	24	5	,, ,, protected outcrop in contaminated area.
16	18	5	,, ,, Piped.
17	280	10	,, ,, Piped. Extra fencing around outcrop.
18	32	15	,, ,, Piped. ,, ,, ,,
19	14	75	,, ,, Piped to reservoir. Extra fencing around outcrop.
20	42	50	,, ,, Piped.
21	560	50	,, ,, Piped. Free flow. Farm on upper slope.
	2,600	506	Totals
	124	24	Averages (uncorrected)
			(b) Rainfall within 48 hours but not within 24 hours (7).
22	1	10	Impounded main spring. Piped. Free flow.
23	360	1	,, ,, Piped.
24	22	10	,, ,, Piped to reservoir. Extra fencing around outcrop.
25	24	50	,, ,, Piped.
26	180	75	,, ,, Piped. Extra fencing around outcrop.
27	16	25	,, ,, Piped from limestone outcrop to reservoir.
28	22	15	,, ,, Piped. Extra fencing around outcrop.
	625	186	Totals
	89	27	Averages
			(c) No rainfall within 48 hours (23)
29	18	10	Impounded main spring. Free flow from rock fenced on hillside.
30	38	10	,, ,, From garden.
31	14	50	,, ,, From open hill-side.
32	68	75	,, ,, Piped to reservoir. Extra fencing outcrop.
33	78	75	,, ,, Piped.
34	12	75	,, ,, Piped. Free flow.
35	79	5	,, ,, Piped. Extra fencing around outcrop.
36	18	1	,, ,, Piped. Extra fencing around outcrop.
37	12	10	Impounded spring. Piped from grazing land, unfenced.
38	4	10	Impounded main spring. Piped to reservoir.

SPRINGS.—*contd.*

Class I. With intake area adequately protected.—contd.

Serial No.	Colonies per c.c. growing at 37° C.	Minimal number of c.c. containing lactose fractors	Notes	
39	154	50	Impounded main spring.	Piped. Farm above hill-side outcrop.
40	123	50	,, ,,	Piped to reservoir.
41	42	10	,, ,,	Piped to reservoir.
42	8	50	,, ,,	Piped. Extra fencing around outcrop.
43	184	75	,, ,,	Piped from rough 4-foot deep diggi.
44	14	75	,, ,,	Piped. Free flow.
45	52	10	,, ,,	Piped to reservoir.
46	28	50	,, ,,	Piped to reservoir. Extra fencing around outcrop.
47	4	50	,, ,,	Piped to reservoir. Extra fencing around outcrop
48	14	50	,, ,,	Piped.
49	2	5	,, ,,	Piped. Extra fencing around outcrop.
50	6	75	,, ,,	Piped. Extra fencing around outcrop.
51	96	50	,, ,,	Piped to reservoir. Extra fencing around outcrop.
	1,068	921	Totals	
	46	40	Averages (uncorrected)	

For whole of Class I Springs.

4,293	1,613	Totals
84	31·6	Averages (uncorrected).

Class II. With intake area inadequately protected.

			(*a*) *Rainfall within 24 hours of sample being taken* (18).
1	8	50	Spring with free flow, arising below a field containing a farmyard. Very heavy rain for many hours.
2	164	1	Tank filled by flow from unprotected area. Tank interior was foul.
3	26	10	Dip-well, fed by main spring which passes under houses. Flow from overflow pipe was 250 galls. an hour.
4	56	1	Intake area not obviously polluted.
5	153	¼	No note was made as to reason for classing this source in Class II. "Bricked tank: fenced-off area; pipes to private houses."
6	1,960	¼	Water piped through foul area, from brick chamber in field to tap by road.
7	36	5	Small area around intake fenced off from contaminated area above.
8	84	5	Main spring with unprotected outcrop and course in grazing land.
9	74	¼	Land spring with piped discharge (2,700 gallons an hour) at roadside.
10	12	25	Main-spring outcrop beside farm-yard.
11	112	¼	Outcrop imperfectly protected. Brick chamber and pipes.
12	200	1	Unprotected outcrop in grazing land.
13	160	5	Dip-well on spring rising below foul grazing field.
14	76	25	Spring from beneath farmyard. Pig pen within 6 feet. Water offensive when boiled.

SPRINGS—*contd.*

Class II. With intake area inadequately protected.—contd.

Serial No.	Colonies per c.c. growing at 37° C.	Minimal number of c.c. containing lactose fractors	Notes
15	8	75	Dip-well on spring (uncovered) by road.
16	96	50	Spring percolates under house and garden. Water passed through a gravel strainer.
17	5	·25	Spring percolates under house and garden.
18	18	·25	Outcrop in grazing field.
	3,248	304	Totals
	180	17½	Averages (uncorrected)
			(*b*) *Rainfall within* 48 *hours, but not within* 24 *hours* (6).
19	192	1	Dip-well on spring by roadside.
20	780	¼	Grave-yard and cesspit just above outcrop.
21	80	5	Unprotected outcrop in grazing field.
22	16	50	Main spring emerging from hillside immediately below graveyard.
23	380	¼	Water stored in foul reservoir.
24	22	1	Outcrop in grazing land.
	1,470	57½	Totals
	254	9½	Averages (uncorrected)
			(*c*) *No rainfall within* 48 *hours* (18).
25	28	2	Water passed through a foul charcoal "filter."
26	27	2	Spring passing beneath village street.
27	49	10	Intake area not fenced off.
28	16	25	Intake area not fenced off but otherwise satisfactory.
29	125	5	Spring courses beside main sewer.
30	59	10	Spring emerges from beneath houses and graveyard.
31	296	10	Open dip-well, fouled by weeds and worms beside street.
32	48	50	Unfenced outcrop in cultivated land.
33	364	25	Open dip-well drains cultivated land.
34	92	10	Outcrop not covered, tank storage.
35	44	10	No note as to why considered unsatisfactory.
36	96	5	Water stored in shallow tank.
37	124	5	Dip-well beside main road.
38	75	5	Spring passes under gardens to dry-stained shallow reservoir.
39	86	¼	Outcrop in farmyard. Stored in dry-stained shallow reservoir.
40	72	1	Water collected after passing through cattle-trough.
41	672	¼	Outcrop in manured orchard and imperfectly covered.
42	168	¼	Water conveyed in leaky pipe passing under farmyard.
	2,441	176	Totals
	136	9·8	Averages (uncorrected)

For whole of Class II Springs.

7,159	537	Totals
170	12·8	Averages (uncorrected)

WELLS.

Class I.—Adequately protected.

Serial No.	Colonies per c.c. growing at 37°C.	Minimal number of c.c. containing lactose fractors		Depth in feet	Steined	Covered	Pumped	Stored in reservoir	Other notes
									(*a*) *Rainfall within* 24 *hours of sample being taken* (4).
1	9	75		..	+	+	+	+	Private supply from "deep well."
2	0	75		..	+	+	+	+	Private water co. supply from "Artesian well."
3	35	5		60	+	+	+	..	Cement steined in upper 12 feet.
4	11	50		25	+	+	+	+	Sunk in sandstone. Area fenced off.
	55	205	Totals						
	14	51	Averages (uncorrected)						
									(*b*) *Rainfall within* 48 *hours, but not within* 24 *hours* (2).
5	15	10		70	+	+	+	..	Sunk in gravel. Area fenced off.
6	4	50		..	+	+	+	..	—
	19	60	Totals						
	9	30	Averages (uncorrected)						
									(*c*) *No rainfall within* 48 *hours* (25).
7	11	50		..	+	+	+	..	"Deep modern well."
8	3	25		35	+	+	+	+	Sunk through rock. Cement steined.
9	7	25		..	+	+	+	..	Beside road and dry steined, but protected by road macadam.
10	5	75		70	+	+	+	+	Area fenced off.
11	12	75		40	+	+	+	+	Cement steined. Area fenced off.
12	35	5		35	+	+	+	..	Sunk through 12 feet of limestone into "black clay." Cement steined.
13	70	75		50	+	+	+	+	Area fenced off.
14	40	50		100	+	+	+	..	Although dry steined, the well is in a clean, fenced-off area in large village green.
15	36	75		6	..	+	+	..	Sunk in solid rock throughout.
16	32	25		93	+	+	+	+	Sunk in clay and gravel. Dry steined, but area well fenced off.
17	10	75		35	+	+	+	..	Although near road and houses, is cement steined.
18	72	75		12	+	+	+	..	Although just below farmyard, is cement steined down to "black clay."
19	8	75		10	+	+	+	..	Sunk in iron stone throughout. Dry steined.
20	36	75		..	+	+	+	..	Although near road and yard, was cement steined.
21	3	75		30	+	+	+	..	Although in road, protected by macadam and steining.
22	53	50		30	+	+	+	+	—
23	16	50		12	+	+	+	+	Well area fenced off.
24	60	1		..	+	+	+	+	,, ,,
25	88	25		60	+	+	+	..	—
26	52	75		40	+	+	+	..	Near road, but protected by macadam.

Wells.—*contd.*

Class I.—Adequately protected.—contd.

Serial No.	Colonies per c.c. growing at 37°C.	Minimal number of c.c. containing lactose fractors		Depth in feet	Steined	Covered	Pumped	Stored in reservoirs	Notes
27	3	50		30	+	+	+	..	—
28	53	50		30	+	+	+	+	—
29	60	1		..	+	+	+	+	—
30	16	50		12	+	+	+	..	Although dry steined, well area is bricked over and fenced off.
31	6	5		12	+	+	+	..	Cement steined. Protected by road macadam. Well under centre of road, pipes to pump at road side.
	787	1,212	Totals						
	31	48·5	Averages (uncorrected)						

For whole of Class I Wells.

861	1,477	Totals.
28	47·6	Averages (uncorrected).

Class II.—Inadequately protected, but free from obvious danger of pollution.

Serial No.	Colonies per c.c. growing at 37°C.	Minimal number of c.c. containing lactose fractors		Depth in feet	Steined	Covered	Pumped	Stored in reservoirs	Notes
									(a) Rainfall within 24 hours of sample being taken (17).
1	22	10		60	+	+	+	..	By road side. Dry steined.
2	240	5		..	..	+	+	..	—
3	130	2		30	+	+	+	..	Dry steined.
4	224	½		..	+	+	+	..	,,
5	50	5		20	+	+	+	..	—
6	14	10		30	+	+	+	..	Covered by clay supported on wood.
7	121	½		40	+	+	+	..	Through 2 feet of soil into rock. Dry steined.
8	78	½		25	+	+	+	..	Dry steined.
9	108	1		15	..	+	+	..	—
10	280	2		..	..	+	+	..	—
11	56	1		20	..	+	+	..	Upper half dry steined; lower half in rock.
12	92	½		120	..	+	+	..	Paved area in village green.
13	32	5		..	..	+	+	..	Area fenced off on village green.
14	68	5		.	..	+	+	..	—
15	16	5		15	+	+	+	..	Dry steined.
16	48	10		10	+	+	+	..	,,
17	112	25		16	+	+	+	..	,,
	1,691	88	Totals						
	99	5·2	Averages (uncorrected)						
									(b) Rainfall within 48 hours, but not within 24 hours (9).
18	160	1		..	..	+	+	..	—
19	10	5		..	..	+	+	..	—
20	12	5		20	+	+	+	..	Covered by an iron sheet.
21	107	½		..	..	+	+	..	—
22	84	½		..	..	+	+	..	—

WELLS.—*contd.*

Class II.—Inadequately protected, but free from obvious danger of pollution.—contd.

Serial No.	Colonies per c.c. growing at 37° C.	Minimal number of c.c. containing lactose fractors		Depth in feet	Steined	Covered	Pumped	Stored in reservoir	Other notes
23	13	5		40	+	+	+	..	Dry steined. Taps "grey rock."
24	53	1		60	+	+	+	..	,, Sunk in rock.
25	6	25		10	+	+	+	..	,, Filled by percolation from brook 20 feet away.
26	5	50		25	+	+	+	..	Dry steined. 12 feet from road.
	450	93	Totals						
	50	10·3	Averages (uncorrected)						
									(c) *No rainfall within* 48 *hours* (27).
27	142	1		..	..	+	+	..	—
28	29	1		40	+	+	+	..	Dry steined.
29	9	10		50	+	+	+	..	,,
30	35	1		..	..	+	+	..	—
31	56	½		5	+	+	+	..	Dry steined.
32	426	¼		30	+	+	+	..	,,
33	150	1		15	+	+	+	..	Dry steined. Town sewered.
34	29	10		..	..	+	+	..	Quite new well.
35	49	5		14	+	+	+	..	Dry steined.
36	98	5		13	+	+	+	..	Dry steined. Well sunk in sand throughout.
37	180	1		20	+	+	+	..	Dry steined.
38	60	50		..	..	+	+	..	This well was placed in Class II on account of lack of data mainly.
39	59	5		..	..	+	+	..	—
40	44	5		20	+	+	+	..	Dry steined.
41	108	5		20	+	+	+	..	,,
42	64	5		..	+	+	+	..	,,
43	38	2		75	+	+	+	..	Dry steined. Through 65 feet of clay to rock.
44	42	5		20	..	+	+	..	—
45	92	5		75	..	+	+	..	A modern well.
46	236	10		..	+	+	+	..	Dry steined.
47	16	2		12	+	+	+	..	Dry steined. Fed by a pipe from protected spring in field.
48	28	5		65	+	+	+	..	Dry steined.
49	10	10		35	+	+	+	..	,,
50	64	5		30	+	+	+	..	,,
51	416	10		30	+	+	+	+	Dry steined. Reservoir is an iron tank needing cleaning out.
52	6	5		30	+	+	+	..	Protected by macadam at road junction. Dry steined.
53	11	25		25	+	+	+	..	Pump pipe leads to well protected by macadam, although dry steined.
	2,497	190	Totals						
	92	7	Averages (uncorrected)						

For whole of Class II Wells.

4,638 371 Totals.

87 7·0 Averages (uncorrected).

WELLS.—*contd.*

Class III.—Inadequately protected and having an obvious source of possible pollution within the proscribed area.

Serial number	Colonies per c.c. growing at 37°C.	Minimal number of c.c. containing lactose fractors		Depth in feet	Steined	Covered	Pumped	Reservoir storage	Other notes
									(*a*) *Rainfall within* 24 *hours of Sample being taken* (34).
1	152	10		..	..	+	+	..	Close to house, garden and road. "Shallow well."
2	17	1		8	..	+	+	..	Surrounded by cesspits.
3	480	¼		5	..	+	+	..	Cesspits on slope just above well.
4	93	1		30	..	+	+	..	Close to stream containing sewage and dead animals. Said to pierce impermeable clay.
5	64	2		..	+	+	+	..	Dry steined. Cesspits within 50 feet.
6	270	1		30	..	+	+	..	Situated in loosely paved street.
7	160	¼		35	..	..	..	..	An unsteined draw-well.
8	1,310	¼		..	+	+	+	..	Dry steined. Cattle yard and farm just above.
9	4	10		5	..	+	+	..	Cesspits within 30 feet.
10	19	25		20	+	+	+	..	Manured garden directly above. No data obtainable *re* steining: may therefore be of Class II.
11	84	¼		20	+	+	+	..	Said to tap main spring in gravel. In field heavily polluted by cattle. Dry steined.
12	196	5		25	+	+	+	..	Brick lined (? cemented) modern well. Bucket closets within 15 feet and overflow ashpit filth within 10 feet. Closet buckets overfull. The only water in whole series containing nitrites.
13	90	¼		4	..	..	..	..	Open dip-well. Filth from earth closet buried in garden directly above.
14	12	1		30	+	+	+	..	Dry steined. Within 10 feet of graveyard.
15	55	10		..	..	+	+	..	Refuse and fæces deposited on slope just above.
16	168	¼		..	..	+	+	..	—
17	380	¼		8	..	+	+	..	Near garden and cesspit. Unsteined.
18	38	¼		20	+	+	+	..	Dry steined. Alongside foul drinking troughs.
19	27	5		20	+	+	+	..	,, Beside road and garden.
20	52	5		25	+	+	+	..	,, Beside garden and dump-pit.
21	79	2		20	+	+	+	..	,, Beside garden and road.
22	204	5		9	+	+	+	..	,, ,, ,, ,,
23	62	5		18	+	+	+	..	,, ,, ,, ,, covering defective.
24	40	5		10	+	+	+	..	,, Beside unpaved road gutter.
25	26	5		..	+	+	+	..	,, Beside garden and road.
26	62	2		12	+	+	+	..	,, Beside field containing pigs.
27	12	2		40	+	+	+	..	,, Beside garden and road.
28	272	2		..	..	+	+	..	Beside cattle trough in public-house yard.

WELLS.—*contd.*

Class III.—Inadequately protected, but having an obvious source of possible pollution within the proscribed area.—contd.

Serial No.	Colonies per c.c. growing at 37° C.	Minimal number of c.c. containing lactose fractors		Depth in feet	Steined	Covered	Pumped	Reservoir storage	Other notes
29	68	2		10	..	+	+	..	Beside garden and road.
30	32	1		..	+	+	+	..	Dry steined. Close to stable.
31	288	5		30	+	+	+	..	,, Covered by loose boards only. Stable within 6 feet.
32	384	¼		6	+	+	+	..	,, Close to allotment gardens.
33	100	5		..	+	+	+	..	,, Beside garden and road.
34	160	5		65	+	+	+	..	,, ,, ,, ,,
	5,460	124	Totals						
	160	3·6	Averages (uncorrected)						
									(*b*) *Rainfall within* 48 *hours, but not within* 24 *hours* (15).
35	480	¼		5	..	+	+	..	Cesspits on upper slope.
36	480	¼		10	..	+	+	..	Pump started by pouring in water from cattle trough under the spout.
37	1,300	2		..	..	..	..	..	Open dip-well with cesspit within proscribed area.
38	190	¼		..	..	..	..	..	Open draw-well, unsteined.
39	450	2		30	+	+	+	..	Graveyard and cesspit on slope just above.
40	137	¼		..	..	+	+	..	Farm just above.
41	68	¼		25	..	+	+	..	Garden and cesspit just above.
42	52	1		..	..	+	+	..	Beside manured garden.
43	14	¼		30	+	+	+	..	Close to garden and graveyard. Dry steined.
44	118	2		30	+	+	+	..	Dry steined. Beside garden.
45	67	2		20	+	+	+	..	,, In smithy yard.
46	134	¼		51	+	..	..	..	Draw-well. Dry steined.
47	12	5		10	+	+	+	..	Dry steined.
48	74	1		10	+	+	+	..	,, Beside village green.
49	10	10		7	+	+	+	..	,, Close to gardens.
	3,586	27	Totals						
	239	1·8	Averages (uncorrected)						
									(*c*) *No rainfall within* 48 *hours* (42).
50	344	50		60	+	+	+	..	Dry steined. Covering defective at well mouth, but surrounding area cemented over. Near road and sewaged garden.
51	48	2		30	+	+	+	..	Dry steined. Flap cover. In village green on raised area.
52	650	¼		7	+	+	+	..	In street. Cement steined.
53	44	1		15	+	+	+	..	Dry steined. Adjoining farmyard.
54	112	2		..	+	+	+	..	,, Night soil buried in garden within 10 feet.

WELLS.—*contd.*

Class III.—Inadequately protected and having an obvious source of possible pollution within the proscribed area.—contd.

Serial number	Colonies per c.c. growing at 37°C.	Minimal number of c.c. containing lactose fractors		Depth in feet	Steined	Covered	Pumped	Stored in reservoir	Other notes
55	29	1		8	+	+	+	..	Dry steined. Pervious cesspit within 7 feet. Condemned by M.O.H., but water being drunk.
56	52	¼		..	+	+	+	..	Near village sewer.
57	55	2		..	..	+	+	..	Cesspit in adjacent garden.
58	21	25		15	+	+	+	..	Dry steined. Beside cultivated garden.
59	8	5		22	+	+	+	..	Dry steined. During heavy rain the cesspit contents are flooded into subsoil levels and marked offence results. This well is said to strike "iron-stone" near the top.
60	35	2		..	..	+	+	..	Beside garden.
61	81	2		18	+	+	+	..	Dry steined. In gravel throughout. Beside garden.
62	121	5		10	+	+	+	..	Beside garden. Lower 8 feet of well are in "iron-stone" rock.
63	215	1		20	+	+	+	..	Said to be cement steined, but "sewer burst into well" two years ago and apparently enteric resulted.
64	57	5		..	..	+	+	..	Beside garden and road.
65	25	5		25	+	+	+	..	Dry steined. Loose cover. In village green.
66	65	¼		12	+	+	+	..	Dry steined. Beside road and garden.
67	65	5		30	+	+	+	..	,, Loose cover. Pig-stye within 6 feet.
68	54	1		16	+	+	+	+	Cement steined. Area fenced off. But for being under repair would be placed in Class I.
69	364	¼		70	+	..	..	..	,, A draw-well.
70	166	2		15	+	..	..	..	Dry steined. Dip-well beside road. Water said to smell offensively in wet weather.
71	1,780	1		5	+	..	..	..	,, Dip-well in foul area, beside garden.
72	1,020	5		20	+	+	..	..	,, Flap covered draw-well, beside garden.
73	488	1		30	+	+	..	..	,, Flap covered draw-well, beside garden and road.
74	1,040	25		40	+	+	..	..	,, Flap covered draw-well, beside road. Pierces rock at 6 feet from surface.
75	146	5		40	+	+	+	..	,, Beside house, gardens, and village sewers.
76	8	25		6	+	+	+	..	,, Beside road and garden.
77	860	1		8	+	+	+	..	,, In village green.
78	22	5		10	+	+	+	..	,, In village green, just below graveyard.

Wells—*contd.*

Class III.—Inadequately protected and having an obvious source of possible pollution within the proscribed area.—contd.

Serial No.	Colonies per c.c. growing at 37° C.	Minimal number of c.c. containing lactose fractors		Depth in feet	Steined	Covered	Pumped	Stored in reservoir	Other notes
79	392	1		..	+	+	+	..	Dry steined. Slab covered. Farm-yard and stinking corpse of dog within 6 feet.
80	98	10		30	+	+	+	..	,, Beside road and garden.
81	504	¼		12	+	+	+	..	,, In street.
82	138	10		40	+	+	+	..	,, Beside farmyard.
83	84	2		30	+	+	+	..	,, Beside graveyard.
84	152	5		35	+	+	+	..	,, Beside sewage manured allotments.
85	44	1		10	..	+	+	..	Beside fowl-run and garden. Not opened for 40 years.
86	516	¼		11	+	+	+	..	Dry steined. Beside fowl run, garden, and road.
87	132	5		..	+	+	+	..	,, Beside road and rubbish heap.
88	36	2		..	+	+	+	..	,, Beside road and garden.
89	88	5		60	+	+	+	..	,, Area fouled by cattle.
90	168	¼		30	+	+	+	..	,, Beside street.
91	46	10		20	+	+	+	..	,, Beside road and cattle field.
	10,373	237	Totals						
	247	5·6	Averages (uncorrected)						

For whole of Class III.—Wells.

19,419 388 Totals.

213 4·2 Averages.

Rivers and Streams.

Serial number	Colonies per c.c. growing at 37° C.	Minimum number of c.c.s containing lactose-fractors	Notes and remarks
			(*a*) *Rain within 24 hours of sample being taken.*
1	31	50	A large river in full flood.
2	1,120	¼	Same river as (1). Sample taken on same day, but close to sewage outfall of large village. Nitrite present.
3	36	2	Small stream in full flood. A tributary of (1).
4	40	2	,, ,, ,, ,, Sample taken on same day as (3).
5	436	¼	After slight rain. There is one village near the course of this small stream.

RIVERS AND STREAMS.—*contd.*

Serial No.	Colonies per c.c. growing at 37° C.	Minimum number of c.c.s containing lactose fractors	Notes and remarks
			(*b*) *No rain within* 48 *hours.*
6	104	1	Small stream with no villages on its short course. Rain (free) 60 hours ago.
7	124	1	Small stream with one village on its course. Rain (free) 60 hours ago.
8	149	$\frac{1}{4}$	Tributary of (7). One village on its course. ,, ,, ,, ,,
9	720	$\frac{1}{4}$	Large stream with large village on its course, three miles above point where sample was taken.
10	214	$\frac{1}{4}$	Large stream with very foul bed. No rain for 5 days.
11	418	$\frac{1}{4}$	Large stream from populated area. ,, ,,
	3,392	$57\frac{1}{2}$	Totals.
	308	5·2	Averages (uncorrected).

CANALS.

1	2,300	$\frac{1}{4}$	Water very turbid after two days' heavy rain.
2	1,280	$\frac{1}{2}$	Above outfall of small sewer. $\frac{1}{25}$ c.c. and $\frac{1}{10}$ c.c. proved negative.
3	2,040	$\frac{1}{25}$	Same canal as (2), but below sewer outfall. $\frac{1}{25}$ c.c. was the smallest amount taken and was positive. The end-point was therefore not reached.
4	244	$\frac{1}{20}$	A stagnant back-water beside a factory. As in (3) $\frac{1}{20}$ c.c. did not reach the end-point.
	5,864	·84	Totals.
	1,466	·21	Averages (uncorrected).

OPEN CATCHMENT AREAS.

			(*a*) *Rain within* 24 *hours of sample being taken.*
1	1,850	50	Large canal reservoir. After 48 hours' heavy rain.
2	1,600	2	Large lake serving as reservoir for supply of private house. After 24 hours' heavy rain.
3	1,220	50	After 48 hours' heavy rain.
			(*b*) *Rain within* 48 *hours, but not within* 24 *hours.*
4	34	1	Water passed through a gravel strainer.
5	116	$\frac{1}{4}$	Reservoir excavated so as to receive subsoil water standing at high level in a grazing field.
			(*c*) *No rain within* 48 *hours.*
6	74	75	Reservoir receives subsoil water from a cultivated area. No rain for 7 days. The subsoil water is protected by a belt of clay.
	4,894	$178\frac{1}{4}$	Totals.
	816	29·7	Averages (uncorrected).

In reviewing these results, the main object is to see how far they serve their purpose by helping to elucidate the following essential points?

(1) Do they afford valuable evidence of the purity of the waters examined?

It is evident that the group averages form a progressive scale as regards both the total organisms and lactose-fractors present. The results thus comply with what should be required of any sound method of bacterial examination, in that they are in general accord with opinions formed from inspection of the water sources. This general agreement is emphasized by the very marked difference between the average results obtained from waters derived from sources classed by inspection as safe, and those derived from sources regarded as dangerous or doubtful. The fact that this series of average results shows a proportionate increase in both the total count and lactose-fractor content, as between the second and third-class well waters, indicates that the total count is worth taking. Without further analysis it appears to be established that the results thus obtained have a very considerable value.

(2) Is the evidence of more value than inspection of the sources in aiding decision as to the probable safety of such sources of supply?

The reply depends upon whether there is a marked difference between the averages of the doubtful and the dangerous groups—as classified by inspection—and whether there are wide individual divergencies within those groups. Taking the dangerous and the doubtful well-water groups (Classes 3 and 2), it is seen that the total count and the lactose-fractor averages of the former are twice as high as those of the latter; and this indicates decisively that the bacterial standards are more sharply defined than the inspection standards can possibly be.

With regard to wide individual divergencies within the groups, this may be gauged in general by the difference between the lactose-fractor data, as estimated by the all-in averages, and the averages obtained after the ten per cent highest and the ten per cent lowest readings have been eliminated. In both the first-class sources the difference is trivial, while in the second and third-class groups there is in each case approximately a difference of thirty-three per cent between the averages as determined by these alternative methods.

The best group to take for detailed consideration is that of the second class (doubtful) wells. Of the fifty-three examined, only

one gave results equivalent to the average of the first-class well waters; while no less than forty per cent. would have been placed in the dangerous group on the lactose-fractor datum, and in fifteen per cent this danger signal is confirmed by the high total count.

It appears, therefore, that both these essential questions may be answered in the affirmative as far as these results are concerned.

Although space does not permit of discussion of many interesting points bearing upon the quality of rural water supplies, it is relevant to say that the majority of the second and third-class wells were sited in objectionable localities, such as streets and road-sides or in cottage gardens habitually manured with the contents of closet pails and cesspits. Moreover, although the district had in the deeper strata wide belts of gault, greensand, limestone, oolite, chalk, and Oxford clay, the majority of wells tapped only the subsoil water, which stood at a generally high level throughout. In few instances had any attempt been made to afford protection by wet-steining of these shallow wells.

With due regard to the care which should be exercised in forming conclusions from limited data, certain general points of military interest would appear to be indicated by these tabulated results :—

(1) First-class wells afford a safer source of supply than first-class springs; while second-class springs are in general preferable to second-class wells, especially after recent heavy rain.

(2) If it can be determined with certainty that a spring or well is adequately protected, it may be considered to afford a moderately safe supply.

(3) The other sources are open to grave suspicion, unless the opinions formed from inspection be confirmed by the results of bacterial examination.

(4) Recent rain has an adverse influence upon the purity of water derived from first-class springs and second and third-class wells.

Standards.

The difficulties in formulating even a tentative suggestion as to definite standards of permissible bacterial content are that there are so few such standards available for comparison, and that those few are based upon data which are not comparable, and are impossible to obtain on field-service. Even were the methods adopted extended—as they might be—to include the lactose-fractor-indol ("agin") test for *B. coli*, we should still lack definite standards to guide us as to *B. coli* contra-indications.

An immediate and considerable value must, however, attach to knowledge of the average to be expected in waters from any given class of source when one is faced by the demand for an opinion as to its safety and the results of bacterial examination are available. Even if no criterion as to actual purity be deducible from these modified data, the relative purity of waters from alternative sources may be gauged. On manœuvres, e.g., the sanitary officer would be

The Complete Equipment.

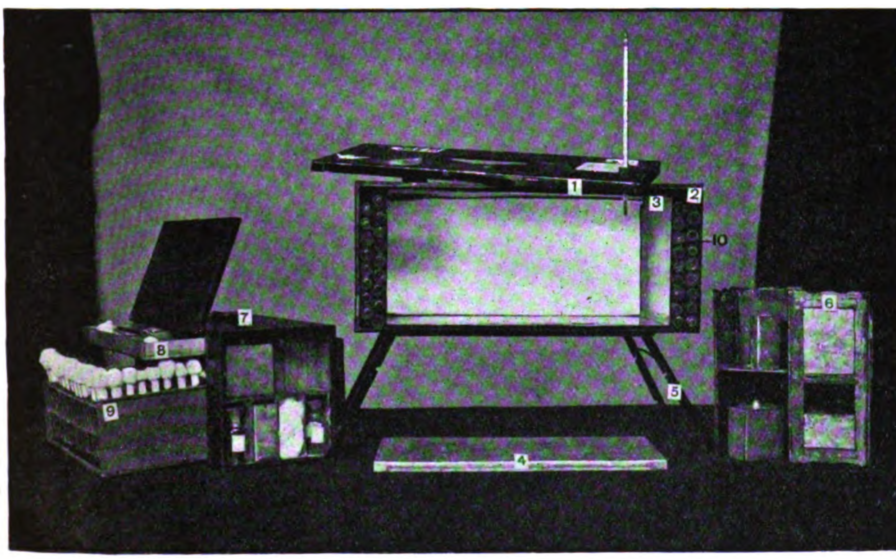
glad enough to know that one of a group of wells gave a water with only thirty per cent of the indicated bacterial impurity of the remainder; while the medical officer in charge of a unit would be grateful for the warning that the only available source of supply in a temporary camp gave indications of a bacterial content thrice that of the mean of the district, and hence called for extra care on the part of his water-duty personnel.

The relative value is thus obvious, and pursuit of this line of

research would rapidly lead to the evolution of actual standards as complementary, of course, to inspection of the source itself.

D.—Applicability of these Methods and Standards to Field Service Conditions.

(*a*) *Equipment.*—Photographs of the equipment render detailed description unnecessary; all that is required here is a list of the articles carried and certain notes on their use in practical working.



Contents of Case A.—1 and 2, Incubation tin and its lid; 3 and 4, sterilizing tin and its lid; 5, folding stand; 6, wind screen around spirit lamp and agar-melting receptacle; 7, sampling cabinet containing 8, drawer, 9, test tube rack; 10, tubes containing media tabloids packed between the sterilizing and incubating tins.

Case A.—Dimensions, 24 by 12 by 10 inches. Weight fifty pounds. This contains:—

(i) A sampling cabinet containing a rack holding sixteen rows of eight graduated test-tubes per row. One filling suffices for examination of sixteen waters, each requiring one tube for the total count on agar, and seven tubes for lactose-fractor tests on amounts of sample from a half to twenty cubic centimetres.

The rack slides out horizontally when the side of the cabinet is let down.

A drawer above the rack holds a thermometer, burettes,

Contents of Case B.—1, Outer shell; 2, tray, the left-hand compartment of which contains tabloid media and packets of compressed wool; 3, tin of kerosine, the compartment below which contains five Erlenmeyer flasks; 4, three gross of test tubes, nested as shown by horizontal three tubes; 5, canvas bucket, fitting around primus stove when packed; 6, duplicate test tube rack, folded, surrounded by tubes of media tabloids.

pipettes, grease-pencil, note-book, labels, spare tubes, and a folding screen which supports the agar-melting receptacle and protects the flame of the spirit lamp beneath it from wind. At one end of the cabinet are shelves for nitrite test reagents, the agar-melting receptacle, spirit lamp and spirit reserve, matches, wool and a weighted dipper containing ten fathom of line. By a handle on top, the cabinet can be lifted out complete with everything required for taking samples at the well mouth.

In practice it has been tested by a hundred-mile tonga journey, an eight hundred feet descent of the khud-side, and a cross country journey in charge of a mounted orderly. The tubes have not been broken nor have the wool plugs been wetted save in few instances. The weight is thirty-five pounds when samples have been added to all tubes. It fits into the tin sterilizer.

(ii) A tin sterilizer, which stands, in its inverted lid, within another tin which forms the outer wall of the incubator.

(iii) the tin which serves as the outer wall of the incubator. Its lid is perforated to allow of passage of a thermometer and has a hole through which the handle of the sampling cabinet passes, for carriage. The space between the tins contains a folded stand beneath the sterilizer, while bottles of tabloid media are packed laterally. When used for incubation, the test-tube rack is placed in the sterilizer and water is poured between the two tin cases; the whole is placed on the stand over a small kerosene lamp. A uniform temperature, as shown by the inserted thermometer, is readily maintained.

For sterilization the smaller tin case is placed over the primus stove.

Case B.—Dimensions 30 by 13 by 12 inches. Weight sixty-five pounds.

(i) The tray holds 3 measure glasses of 200 c.c.; 3 spare thermometers; 3 large flat porcelain dishes; 3 burettes of 50 c.c., and stand for same; tabloids of compressed media; test-tube brushes; various reserves for the sampling cabinet.

(ii) The compartments beneath the tray hold a folding test-tube rack, which is in duplicate with that of the cabinet; a box containing three gross of test-tubes, nested in threes; a primus stove; one and a half gallons of kerosene oil; a small lamp for the incubator; three glass funnels; five Erlenmeyer's flasks of 120 c.c.; a collapsible canvas bucket, which fits around the primus stove; four hundred Durham's fermentation tubes; four pounds of wool compressed into small packets; a further supply of tabloid media; one ounce of azolitmin.

Media Ingredients :—

(i) Azolitmin is carried in crystals, of which a pinch gives a good colour to a considerable bulk of medium, and affords a satisfactory reaction. It is thus preferable to litmus. One ounce suffices for the examination of five hundred water samples.

(ii) The ingredients for five cubic centimetres of nutrient agar are compressible into tabloids of a quarter by one-twentieth of an inch. One tabloid thus serves for each tube used for a total count. For examination of five hundred waters, two and a half ounces of tabloids are required. They can be packed in small glass tubes.

(iii) One tabloid of one inch by a quarter of an inch contains compressed materials for one hundred cubic centimetres of MacConkey's medium. This is exactly enough for the examination of one water sample, and weighing and waste are obviated by using tabloids of this size, which would be best carried in vulcanite tubes. Four pounds of such tabloids would be enough for examination of five hundred waters.

If the above amounts be carried, with four pounds of wool (compressed into small packets), one pint of spirit and one and a half gallons of kerosene, five hundred waters could be examined without need for refitting the equipment. All breakable parts of the equipment are provided in triplicate in the cases, including the test-tubes, the bulk of which is reduced to reasonable dimensions by nesting in graduated sizes.

(*b*) *Daily Routine in the Field.*—Over-night, the cabinet tubes are filled with medium and sterilized as follows :—

Sufficient tabloids of MacConkey medium to give the necessary amount of triple strength are dissolved in the Erlenmeyer flasks. From this enough is diluted to give the requisite amount of single strength medium. The whole is coloured by azolitmin.

Durham's fermentation tubes are placed in a porcelain dish and covered by single-strength medium. They fill themselves and can be rapidly dropped into the filled test-tubes. The proper amounts of triple or single strength medium are run into the tubes from a burette.

One agar tabloid is then dropped into each total-count tube and five cubic centimetres of water are run in. The agar dissolves during subsequent sterilization, which is effected over the primus stove, the whole rack of test-tubes being placed in a few inches of water in the sterilizer. The whole process of preparation and sterilization of the full complement of test-tubes—one hundred and twenty-eight for the cabinet—can be carried out in two hours by one person.

The test-tubes used during the following day are placed in the incubator on return to camp, the rack being lifted out as it stands, and being replaced in the cabinet by the duplicate rack. The cabinet is thus ready for the second day's work, while the samples already collected are left to incubate and have their results read off at the appropriate period. Washing up is effected by leaving the dirty tubes to soak in the canvas bucket filled with water, which is changed two or three times. Inversion and drainage make the tubes clean enough as a rule.

The method of facilitating the total count by re-heating the agar has been referred to, but is only necessary where the count is unusually high.

It is surprising how rapidly this work can be done by a skilful orderly after a little practice, and how few are the breakages. After the examination of the two hundred and eighty-nine water samples, it was found that only two per cent of the test-tubes were broken. The greatest loss is that of the Durham's tubes, of which twenty per cent were broken in the same period.

(*c*) *Standards.*—It is impossible to attempt the definition of standards of bacterial purity of waters—as indicated by the results obtained by these methods—on the limited data at present available. All that can be done here is to state the averages worked out in the hope that extended observations may lead to the evolution of standards whereby opinions formed on inspection of the sources may be controlled.

The courtesy of Captain N. Low, R.A.M.C., has, however, placed at my disposal the results obtained by him from work with this equipment, and thus enabled a comparison to be made between data obtained by independent observations during successive manœuvre seasons in areas widely separated.

		Lactose-fractor minima	
		Captain Low's averages	Previous averages
Springs	Class 1	36·8 c.c.	31·6 c.c.
	Class 2	12·2 ,,	12·6 ,,
Wells	Class 1	75·0 ,,	47·6 ,,
	Class 2	34·5 ,,	7·0 ,,
	Class 3	4·0 ,,	4·3 ,,

The disparity between the averages for first and second-class wells is due to difference in procedure; Captain Low classified these wells *after* taking his bacterial findings into consideration, whereas I classified according to opinions formed from inspection and worked out the averages for wells thus classified—with the object of comparing these two methods and obtaining initial data.

It is significant that Captain Low would have classed fifty-eight per cent of the total wells examined by him as being first or second class by inspection alone, while only twenty-six per cent were allowed to remain in those classes upon the bacterial findings.

The other figures show a striking similarity, especially in view of the fact they were obtained independently in different areas in different seasons.

(*d*) *Utility on Field Service.*—This needs consideration from various standpoints according to the conditions obtaining.

(1) Manœuvre areas present no difficulties; they can be worked from centres where incubation can be carried out from day to day, while fresh sources are being sampled during the preliminary water reconnaissance.

(2) During the movement of troops by long road marches, such as occurs in India, these methods may still be made applicable. An orderly could keep ahead of the main body; sample early each morning and leave the samples to incubate; wait until noon for the arrival of the incubation rack sent on from the preceding camp; proceed to the next camp and sterilize in readiness for the next day's work.

The Medical Officer could make an early start daily; on arrival in camp read off the results of the samples left to incubate from the preceding day by the orderly; despatch the incubation rack to the orderly at the next camp—to reach him by noon; decide on the water source and supervise the provision of a safe supply before arrival of the main body later in the day.

This procedure would not interfere with the duties of the medical officer in attending daily to the sick of the unit.

(3) On active service there are obvious difficulties and limitations. During strategical concentrations arrangements similar to those indicated above may still be applicable to a considerable extent, but the onset of tactical operations must render their continuance impossible.

It is probable that the lines of strategical concentration will become the lines of communication in the majority of successful campaigns, and it is upon the lines of communication that knowledge of the bacterial content of water supplies will be the more readily obtainable and, for the following reasons, the more valuable.

(i) In a modern campaign in a civilized country the conditions as regards water supplies should be moderately satisfactory in fresh areas occupied during an advance. Those conditions will rapidly

deteriorate as the wave of advance leaves in its wake more or less complete disorganization of sanitary precautions and services maintained prior to hostilities.

(ii) It is during marches of small detachments, such as are constantly passing along the lines of communication, that measures which work well in safeguarding the water supplies of full units are apt to break down—either from lack of equipment, of trained personnel, or of organized medical supervision.

Water sources are thus liable to become progressively fouled, and this pollution become progressively the more dangerous as the camps are used by sick convoys en route to the base.

(iii) It is of the utmost importance that reinforcements on their way to the front should arrive there free from infection.

Seeing that upon medical officers in charge of sanitary districts on the lines of communication will fall the mportant duty of controlling the safety of water supplies to these camps, it is obvious that knowledge of the normal bacterial content of these waters would be of very great assistance. Initially this knowledge would indicate which camp waters called for special care and hence enable the best distribution to be made of the equipment and personnel available. Subsequently, periodical examinations would afford early warning of pollution and thus enable control to be established over the efficiency of the precautions taken.

The more portable the equipment supplied for this purpose to sanitary officers on the lines of communication, the more rapidly could the sanitary organization of these districts follow in the wake of the advancing troops and establish an efficient control which is likely to exert a marked influence upon the health of the force and hence upon the progress of the campaign.

In acknowledging, in conclusion, the assistance which I have received in conducting this investigation, I feel that I should do an injustice to Corporal E. Weavis, R.A.M.C., if I omitted to refer to the valuable aid rendered by him. Without his loyal and intelligent co-operation this work could not have been carried out, and I am glad of this opportunity of acknowledging the extent of my indebtedness to him.

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GOD'S ACRE IN NORTH-WEST INDIA.

By Colonel R. H. FIRTH.

The above title may be open to some criticism, but it expresses adequately the ground which this article traverses, in that the following pages are devoted to a record of the names, the careers, and details as to the graves of, or monuments to, all the medical officers buried or memorialized in the Punjab, the North-west Frontier Province, and Kashmir. A few details of men are given also who were not medical officers, but their claim for inclusion in this article rests either on the fact that they were sons of medical men or, otherwise, that their careers suggest matters of interest. So far as one is aware, there are no omissions, but that there may be omissions is probable, as, undoubtedly, some medical officers have died and been buried in the area of whom no memorial exists. The collection of the data has covered some years and involved a visit to every church and cemetery in the provinces named, with the exception of the graveyards in Kashmir, which have not been visited personally.

Prefatory to giving the details referred to, it may not be inappropriate to make some general or historical remarks. In point of antiquity, the Christian monuments of the Punjab are uninteresting compared with the Dutch and Portuguese inscriptions of the sixteenth and seventeenth centuries which are still to be seen in Madras and Bombay. The British flag only crossed the Jumna in 1803, and the Sutlej in 1846, and of the Christian adventurers who lived or travelled in the Punjab in the days before British rule but the scantiest relics remain. There were Portuguese missionaries in Lahore in the days of Akbar and Jehangir, but all trace of them has gone; similarly, Armenians were known in Sirhind and Multan during the time of the Moghuls, but there is no trace of their monuments before the close of the eighteenth century. Of that period, a few Armenian monuments survive in the old Deremao cemetery at Delhi, the earliest being that of Karo, of Tiflis, who died in 1787. In that cemetery is the oldest Christian monument in the Punjab, that of Messiah, apparently a native convert, whose epitaph relates how he left this world on January 10, 1782, friendless like his Master. Of the officers of the Mahratta service and the other free-lances, who made the debatable lands a happy hunting ground, but few monuments are left. Five only of these soldiers of fortune are commemorated by any monument in the Punjab; three of these

are of no note, namely, Deramao at Delhi and Ferez and Etienne at Gurgaon. Of the other two, there is a tomb to the valiant Bernier at Hansi, while James Skinner lies before the altar of the church he built at Delhi.

The second generation of adventurers who took service with Ranjit Singh have likewise left few memorials. Allard died at Peshawar, and though no stone exists to his memory, contemporary evidence makes it certain that he lies in the mausoleum in the grounds of Kapurthala House at Lahore, by the side of his little daughter, which gives the house its name of the "Kuri Bagh." The dust of many of the foreigners who came to the court of Ranjit Singh must lie at Lahore, probably some under the unnamed tomb in the Anarkali garden, some in the graves at Muzang, and some in the tombs at the north corner of the compound of the house, now known as "The Lawn," in Lahore, near the Mauj Darya shrine. At Haripur lies Canara, the Viennese artillery officer who was shot by his own men. John Holmes, the half-caste bandsman, who became a Colonel in the Sikh service, lies in a nameless grave at Bannu; he, like many of the officers in the Sikh service, having been killed by his own troops when the Punjab rose in 1848. Ford was killed by Sikh mutineers at Peshawar, and Foulkes at Mandi, while McPherson is buried at Ahmadpur, near Multan. At Sujanpur, in the Kangra district, is said to be the grave of O'Brien, one of the first deserters from the British who took service with the minor native chiefs. At Nurpur in the same district is the grave of the adopted son of Josiah Harlan who, after being Ranjit Singh's secret agent, became Governor of Nurpur and Gujrat. Last of his race lies Alexander Gardner in a nameless grave at Sialkot. At one time he was a robber chief among the Pathans and at another he was a governor under Ranjit Singh; he died at Jammu, but, wishing to be buried among Christians, his body was brought to Sialkot and buried there.

Coming to the advance of the British flag over the Punjab, we find a cross to the memory of the nameless dead in the old cemetery at Dariaganj in Delhi. These nameless dead are probably those who fell at Laswari in 1803. The oldest grave which I know of, belonging to this era, is that of a Captain Bagshaw at Karnal, dated 1807; the earliest inscriptions at Delhi are those of Serjeant Walker in 1808, and of Major Eagle in 1811. The only traces of the Gurkha War are those recorded on a monument at Nahan to four British officers who fell in the actions of Jampta and Jaithak. A grave at Sabathu of William Murray recalls the same period.

From 1830 to 1844 Karnal was our frontier station, and contains many of our dead. Ludhiana was long our advanced post upon the Sutlej; the graves there date from 1813, and three mark the resting-place of the bodies of those killed in 1846 by the falling in of the barracks of the 50th Regiment. Another old cantonment was that of Bharawas, near Rewari, but no inscriptions exist to tell us who lie buried there. At Sabathu are many graves dating from 1827, including that of Murray, who distinguished himself in the Gurkha War, and died in 1831. The Simla graves go back to 1829. A relic of the first Afghan War is to be found at Bhawalpur in the grave of Lieutenant-Colonel Duffin, who died in 1838. Similarly, at Ferozpur is the tomb of an officer wounded at Jagdalak, and in a bazaar at Rawul Pindi is the grave of Lieutenant Frere, who died on the return march of the avenging army. Between Ferozpur and Ludhiana are the four battlefields where was decided the Sutlej Campaign of 1845-6. Obelisks mark the scenes of those contests, but, save at Mudki, those whose bodies were not brought into Ferozpur lie in nameless and untraceable graves. Tablets to them all exist in Ferozpur Church, which itself is a memorial to those who fell in that war. The period of tranquillity after the first Sikh War is marked by the grave of Major Troup at the frontier post of Mukerian, and by others at Jullundur, Hoshiarpur, Nikodar, and Kangra. Then came the second Sikh War of 1848-9, of which many graves and memorials exist at Multan, Ahmadpur, Ramnagar, Chilianwala and Gujrat.

After the annexation of the Punjab, it is on the North-west Frontier that we find graves marking the onward progress of our rule. Kohat, Haripur and Peshawar are full of them, of which not a few are those of men who fell victims of the fanatic's knife. Other than those, there are few monuments of special interest before the year 1857. Delhi and all around it presents many grim witnesses of the end of those either massacred during the great sepoy revolt or who fell in the struggle for that Imperial city. Apart from Delhi, the cemeteries of Hissar, Hansi, Sirsa, Ludhiana, Jhelum, Gurdaspur, and Sialkot testify to the vicissitudes of the time. The next event of importance to which the cemeteries of North-west India bear witness is the Ambeyla Campaign of 1863. Most of the dead lie in the old cemetery at Mardan, but some are to be found at Nowshera and Peshawar. Our advance into Afghanistan in 1878, and the subsequent massacre of the Cavagnari Mission on September 3, 1879, are recalled by graves at Peshawar and tablets at Mardan and Abbottabad. Later expeditions and

little wars, such as those in Hazara, in Chilas, in Chitral, in Tirah, in Waziristan and against the Mohmands, all present reminders of comrades gone, in the many graves and memorials which exist in every church and cemetery along the frontier, from Chakdara through Mardan, Jumrud, Kohat, Datta Khel, and Tonk to Para Chinar. With relief, one turns east of the Indus, to an area whose record for fifty years has been one of peace and where, save for the Dharmsala earthquake of 1905, the graveyards bear witness to no striking events.

Before passing to the main theme of this article, one is tempted to remark that a roll of death far sadder than that in battle is that of those who have perished on the frontier by assassination. From Mackeson in 1853 to Bowring in 1904, the roll is a long one. Some will be referred to in the following pages, as their graves or memorials have all been visited by me, but the graves of Surgeon Smith and Lieutenant Kinloch, murdered on the Zaimukht frontier in 1879, I have been unable to find. As conducive to orderly method, one proposes to set forth the facts collected, not in an alphabetical sequence of names, but according to locality or place.

ABBOTTABAD.

Assistant-Surgeon David Keith was the son of Dr. Alexander Keith, of Edinburgh; he was born May 7, 1829, and entered the Bengal Army in 1851. Attached originally to the artillery at Meerut, he was put in medical charge of the 3rd Sikh Infantry, in December, 1852, and proceeded with them to Hazara on service against the Hasanzais. The regiment subsequently went into camp at Abbottabad, and he died there on July 14, 1853.

Surgeon-Major James R. Johnson entered the Bengal medical service in 1859, as an assistant-surgeon, and joined the artillery train at Peshawar. In 1860 he proceeded with the Mahsud Waziri Expedition. In the following year he was appointed to the 1st Sikh Infantry at Bannu, with whom he remained till 1866, when he was transferred to the Corps of Guides. In 1872 he became medical officer to the 5th Gurkhas; he went home on furlough for a year early in 1876. After his return he accompanied his regiment on the Jowaki Expedition of 1877-8; returned with the regiment to Abbottabad and died there on May 20, 1878, from typhus fever contracted "whilst attending the famine-stricken poor in Hazara." He married Charlotte Frances, eldest daughter of Lieutenant-Colonel R. G. Simeon, of the 10th Light Cavalry. She died September 18, 1872.

AMBALLA.

Assistant-Surgeon John Edward Jenkins entered the service on June 8, 1841, as assistant-surgeon in the 31st Foot. He arrived in India at the end of the year, but was unable to join his regiment as it was in Afghanistan. On its return he joined the regiment at Amballa in February, 1843. He died at that place on August 14, 1844, a tomb being erected there by his brother officers to mark their esteem.

Surgeon John Dalrymple entered the Medical Department of the Bengal Army in 1820. Originally with the 6th N.I. at Delhi, he was transferred to the 1st Grenadier battalion in 1824 and served with it during the first Burmese War. In August, 1826, he was posted to the 52nd N.I. and stayed with them till he went home at the end of 1829. On his return to India he was posted to the 20th N.I. with which corps he continued serving until August, 1835, when he was transferred to the 9th Cavalry. With that regiment he served at Karnal, Muttra, and later on through the campaign of 1843, being present at the battles of Miani and Hyderabad, in Sind. After the termination of hostilities he took leave to Simla, and it was while on his way back that he died at Amballa on November 27, 1844.

Surgeon James Smith entered His Majesty's service on June 10, 1812, as a hospital assistant. Within a few months he was appointed assistant-surgeon to the second battalion of the 4th Foot. On the regiment being disbanded at the end of 1815, he was transferred to the 29th Foot and joined them in France, remaining there till the regiment went to Ireland in 1818. He was then put on half-pay and continued so for twelve years. On May 10, 1831, he was brought back on full pay as assistant-surgeon of the 17th Foot and went with them to New South Wales. In 1836 he came to India with the regiment and proceeded with it to Sind. On February 15, 1839, he was promoted to the rank of surgeon in the 61st Foot and joined them in Ceylon. Landing with the regiment in England in 1840, he served with it in various places at home till June, 1845, when he embarked with it for Bengal. On arrival in India he went with the regiment first to Cawnpur and then to Amballa, and he died at that place on the very day the corps arrived there, November 27, 1846. At the time of his death, Smith was 60 years of age, and that fact is full of suggestion as to the conditions of our service at that time.

Assistant-Surgeon John Lawrence Johnston was born March 23, 1824, and joined the 43rd Foot as assistant-surgeon on the last

day of 1847. He was with the regiment in Ireland till transferred on April 3, 1849, to the 75th Foot. With that corps he proceeded at once to India and arrived at Amballa towards the end of 1849, at which station he continued serving with the regiment until his death on May 24, 1853.

Inspector-General Charles St. John entered the service on August 8, 1811, as a hospital mate for general service and immediately joined the forces in Spain. On September 3, 1812, he was appointed an assistant-surgeon in the first battalion 58th Foot, and served with that regiment throughout the remainder of the operations in the Peninsula, including the action of Castalla and the siege of Tarragona. In the spring of 1814 he left with his battalion for Canada and served with it there during the closing operations of the American War. The following year he went with the regiment to Paris as a part of the army of occupation. From 1816 to 1822 he served with the 58th in Jamaica, but being promoted surgeon to the 61st Foot, also in the island, he returned home with that regiment in May, 1822. He continued with the 61st and went with them to Ceylon in November, 1828, serving with the battalion till December, 1836, when he was promoted staff surgeon. On January 4, 1839, he was promoted assistant inspector-general and served in that capacity for some years in Mauritius. On October 20, 1843, he was advanced to the rank of deputy inspector-general and posted to Ceylon, where he remained till the spring of 1846. He then went to Madras, where he served for four years. On July 19, 1850, he was made Inspector-General of Hospitals in India, an appointment analogous to Director of Medical Services of our day. He died at Amballa on September 12, 1853.

Surgeon George Taylor Cornelius Fogarty was born at Tipperary in 1814 and entered the Bengal Medical Department in 1840. He was soon put in charge of the 14th N.I. at Nasirabad, but later transferred to the Kotah contingent. In June, 1844, he was given permanent medical charge of the 70th N.I. then at Neemuch, and with them he seems to have more or less remained for the rest of his service. With that regiment he went through the second Sikh War and the Punjab Campaign of 1848-9, including the battle of Ramnagar, the passage of the Chenab, the battles of Chilianwala and Gujrat, and the pursuit of the enemy to the Khyber. After the war he acted for a time as medical storekeeper at Amballa, but on promotion to the rank of surgeon he was reposted to the 70th N.I., with whom he continued serving until his death at Amballa on September 3, 1854.

Lieutenant William Drummond Ross interests us only because he was the son of Surgeon Andrew Ross, of the Bengal Medical Service. Born at Nagpur in 1824, he was appointed to do duty, at his own request, with the 15th N.I. in April, 1842, at Delhi, where his father then was the civil surgeon. Young Ross was posted in June of that year to the 28th N.I. and joined that regiment at Barrackpur. He served in the 28th for many years, including the Punjab Campaign of 1848-9. Being born in the country young Ross had a fluent command of the vernacular and from time to time seems to have been employed on special duty as an interpreter, more particularly as superintendent of the bazaar attached to the Commander-in-Chief's camp. In November, 1854, he applied for and was given furlough to go to England, but was too ill to go and died at Amballa on the 20th of the following month. He married Anna Maria Elizabeth, the daughter of Major M. A. Bunbury, of the 40th N.I. A son of this marriage is buried also at Amballa.

Surgeon Robert Joynt Gordon Grant entered the service on September 7, 1826, as a hospital assistant, and on December 18, 1828, was appointed as an assistant-surgeon to the 22nd Foot. He joined the regiment in Jamaica and served with it there and in Ireland till December 15, 1840, when he reverted to the staff. On April 1, 1842, he was appointed surgeon to the 10th Foot, embarking at once with it for India. He served with that regiment through the Sikh War and was present at the battle of Sobraon. In December, 1846, he exchanged to the 9th Lancers and served with them through the Punjab Campaign, including the passage of the Chenab and the battles of Chilianwala and Gujrat. At the end of the war he went with the regiment to Amballa and died there February 15, 1856. He married at Bath, in July, 1832, Mary, the relict of the Rev. H. Towton, rector of Vere in the island of Jamaica.

AMRITSAR.

In this station only one grave attracts one's attention; it is that of Captain John Crommelin Lamb, who was the son of Assistant-Surgeon John Lamb, of the Bengal Medical Department, and many years the civil surgeon of Malda. Young Lamb was born on August 14, 1818, and entered the Bengal Army in 1837. He was posted to the 52nd N.I. and served with it in the Marwar field force and through the Punjab Campaign, taking part in the action of Mattithol, the first siege of Multan, the action of

Surajkhund, and the final attack on Multan. At the end of the war Lamb passed into the Public Works and became executive officer of the Lahore-Amritsar road, dying at Amritsar on June 24, 1854.

ATTOCK.

Here but one grave interests us. It is that of Assistant-Surgeon John Kirk, who entered the Bengal Service in 1855. He was soon sent to Peshawar, and from there detached to take charge of a wing of the 7th Irregular Cavalry and to be garrison surgeon at Attock. Whilst continuing to do these duties he died there of heatstroke on July 21, 1857.

BANNU.

Lieutenant-Colonel Charles Kenneth Mackinnon was the son of Surgeon Kenneth Mackinnon, of the Bengal Medical Service. Born at Muzaffarpur on December 15, 1840, he entered the Bengal Army in 1858. His first few years of service were with the old 63rd N.I.; then he joined the 6th Punjab Infantry at Bannu in 1863, serving with that corps in the Abeyla Campaign and distinguishing himself at the recapture of the Crag picquet position on November 20 of that year. Subsequently he went to the 3rd Punjabis and saw much frontier service. In 1832 the regiment was disbanded and he was given command of the 5th Punjab Infantry, leading that corps in the Takht-i-Suleiman Expedition of 1883. He was still occupying that position when he died at Naurang, near Bannu, on March 8, 1887. He married in 1867 Anna Sutherland, the daughter of Alexander Broadfoot.

The cemetery at Bannu contains no other graves which interest us, but the church contains memorial tablets of which those inscribed with the names of Brigadier-General John Nicholson, Surgeon C. C. Cassidy, and Austin Gunter, of the I.C.S., appeal for notice. The details of all these men will be referred to under the headings of Delhi, Datta Khel and Peshawar, where their respective mortal remains lie.

CAMPBELPUR.

Surgeon David Field Rennie entered the service as an assistant-surgeon on September 19, 1848, and served chiefly with the artillery at home till the autumn of 1857. Being promoted staff surgeon he then went to Western Australia, but was transferred to China in 1860. There he was in medical charge of the artillery of the first division, and with that arm served through the military

operations of that year, including the capture of Tang-ku, the affair on the Peiho River, and the capture of the Taku forts. On June 4, 1861, he was appointed surgeon to the 31st Foot, then in China, and with that regiment saw much service during the suppression of the Taiping rebellion. In May, 1863, he was promoted staff surgeon and transferred to India, where he was employed chiefly on administrative duties till the middle of 1865, when he went home. On reaching England he found that he had been appointed surgeon to the 20th Hussars, then in India. He joined that regiment at Campbelpur and died there on April 4, 1868. The date of his death is incorrectly stated in the inscription on his grave. Rennie seems to have been a man of parts, as he wrote three books, one called "The British Arms in North China and Japan"; one "On Pekin and the Pekinese"; and another "On Bhutan and the Story of the Dooar War."

CHIRAT.

In this station I have been able to find but one item of interest to us. It is an inscription on a large rock in the cemetery near the parade ground and runs: "Sacred to the memory of R. F. Maunsell, Staff Assistant-Surgeon attached to the 104th Fusiliers; died 8th Nov. 1869. R.I.P. Removed to Ireland 26th Oct., 1870." Of this officer I can find the following facts:—

Assistant-Surgeon Robert Frederick Maunsell joined the service as a staff assistant-surgeon on March 20, 1868, but was given rank from October 1, 1867. He was sent out to India almost immediately and soon found himself attached to the 104th Foot, marching to Peshawar. On arrival there he went with a wing of the regiment to the sanatorium at Chirat. There he died on November 8, 1869. His remains were removed to Ireland in the following year.

DAGSHAI.

In the old cemetery of this hill station is a memorial over a grave inscribed, "Erected by the Officers of H.M.'s 75th Regiment to the Memory of Assistant-Surgeon John S. Willes, M.D. Died 21st July, 1852."

Assistant-Surgeon John Shaw Willes entered the service on March 15, 1844. He was appointed assistant-surgeon to the 17th Foot and came out to India at once to join the regiment then at Ahmednagar. He soon saw service during the operations in the southern Mahratta country and, early in 1846, accompanied the

regiment to Sukkur as part of the Sind field force. With the regiment he went home in March, 1847, but had not been in England long before he was sent to join the 88th Foot then in Barbados. He remained with them till March 15, 1850, when he was transferred to India and proceeded to join the 75th Foot. He remained with that regiment at Amballa till the spring of 1852, when he was sent to Dagshai for temporary duty with the 98th Foot, and at that station died on July 21 following.

Datta Khel.

At this post in the Tochi valley lie the remains of poor Cassidy, whom I knew well.

Surgeon-Captain Christopher Clemens Cassidy was born September 23, 1864, and entered the Indian Medical Service, as surgeon, on January 31, 1891. His first charge was the 18th Bengal Infantry, at Silchar, but he was soon sent to the 19th Bengal Infantry, at Rawul Pindi, and with them went to Fort Sandeman. Transferred to civil in June, 1893, he was in various places in Bengal till March, 1896, when he was given charge of the 1st Sikh Infantry then serving in the Tochi. While with the escort of the political officer of the Tochi valley at Maizar on June 10, 1897, the whole party were attacked treacherously by Mada Khel Waziris, and in the conflict which ensued he was shot through the knee and died at Datta Khel twelve days later. A memorial tablet to his name exists in the church at Bannu.

Delhi.

As might be expected, this place is full of graves and monuments to officers and men, but contains relatively few to medical officers. Graves of the following are in the Rajpura cemetery at Delhi.

Surgeon William Dollard entered the Medical Department of the Bengal Army in 1825, and was sent to do duty with the 5th Battalion of Artillery at Dum-Dum and later on at Cawnpur. In 1827 he was appointed to the 54th Infantry at Rangpur, in Assam, moving afterwards to Nasirabad and Benares. In October 1833, he was transferred to the 7th Infantry, which he joined at Gorakhpur. He served with them at Lucknow, Cawnpur, Neemuch and finally at Delhi; there he died on October 4, 1845. His grave bears the inscription that it was "Erected by Major-General Hamilton, Major Holmes, and Officers of 7th Regiment N.I., to commemorate the great worth and high merits of their esteemed

brother officer, the late Dr. William Dollard, who departed this life at Delhi on the 4th, Oct. 1845, aged 45 years."

Surgeon Robert McIntosh was born December 23, 1799, and entered the Bengal Army, in its Medical Department, in 1824, when he at once joined the artillery train at Meerut. At the end of 1827 he was sent to Delhi as garrison surgeon and stayed there till 1838, when he was placed in medical charge of the 6th Battalion of foot artillery and served with it throughout the expedition to Afghanistan of 1838-9, including the capture of Ghuzni and the occupation of Kabul. On returning to India he was transferred to the 48th N.I. at Ludhiana. In December, 1845, he was appointed to the 42nd N.I., and was with them throughout the Sutlej Campaign, including the battle of Sobraon. Early in 1847 he arrived with the regiment at Delhi and applied for leave to go to Europe, but before the leave was granted he died there on October 31, 1847, in his 48th year.

Surgeon Thomas Stott was born September 9, 1807, and entered the medical service of the Bengal Army in 1831. During the first two years he did duty with the 20th N.I., but at the end of 1833 was posted to the 68th N.I., with which he served mainly in Rajputana. Two years later he went back to the 20th N.I., and accompanied them on the Afghan Campaign of 1838-9, returning to Nasirabad in 1841, where he remained till 1844 when he went home on furlough. Returning in 1847 he rejoined the 20th, but a year later was transferred to the 53rd N.I. With them he served through the Punjab Campaign and, on its termination, proceeded with the regiment to Delhi, dying there on the very day of its marching in, namely, on January 19, 1850. His gravestone has recorded on it, "Deeply regretted by his brother officers, by whom, as a token of respect, this monument is erected."

Record is made of the grave of the following officer, as it and that of his brother, at Dera Ghazi Khan, are graves of uncles of the writer, and the search for which led originally to the collection of the data upon which this article is founded. The grave is in the Rajpura cemetery and has recorded on it, "In memory of Lieut. W. T. Somerville, of the Bengal Artillery, who died in camp before Delhi, at the age of 21 years, on September 5, 1857, of fever brought on by fatigue and exposure. This monument has been erected by his affectionate friend, Major-General Huthwaite, C.B." This Lieutenant William Thomson Somerville was the third and youngest son of James Somerville, of Ross, in the county of Meath, by Frances, daughter of Skeffington Thomson, of Rathnally. He

was grandson of Sir James Somerville, Bart., and cousin to the first Lord Athlumney. Born March 7, 1836, young Somerville joined the Bengal Artillery in 1854. Until the outbreak of the mutiny he served at Meerut, and subsequently throughout the siege of Delhi.

Among the graves in the cemetery outside the Kashmir Gate, Delhi, are two only which call for notice; they are those of the great John Nicholson, and of Assistant-Surgeon W. G. Morris. Of the career of Brigadier-General John Nicholson one need say nothing here except to remark that his name will ever be associated with the great struggle and crowning victory of our arms before Delhi in 1857. In this place his name and memory appeal to us from the circumstance that he was the son of a doctor; namely, the eldest son of Dr. Alexander Nicholson, of Dublin, who was a cadet of the Nicholsons of Stramore, in county Down, and of the Nicholsons of Crannagael in county Armagh, by Clara, his wife, daughter of William Hogg, of Lisburn, and sister to Sir James Weir Hogg, Bart. Apart from his grave, memorial tablets to the memory of Nicholson exist at Bannu, also on the Mutiny Memorial on the Ridge at Delhi, and on the wall of that city at the spot where he was fatally wounded. Besides these mementoes, there is the monument at the Margalla Pass, near Rawul Pindi. After lingering for nine days, Nicholson died on September 23, 1857. Of him one can say, " Multo ille flebilis occidit."

Assistant-Surgeon William Gardiner Morris was born in Philadelphia, in 1826, and entered the Bengal Army in the Medical Department, November 20, 1848. His earlier years of service were passed in varied charges at Benares and Peshawar. Towards the end of February, 1850, he was appointed to the charge of the 70th N.I., but within a year was transferred to the Sirmoor Battalion which he joined at Almora, and with them passed the rest of his service. He was at the action of Badle ki Serai and through the whole siege of Delhi. After the fall of that city, he stayed with the battalion for duty, and died there on January 13, 1858. The memorial over his grave was placed there by the officers of the Sirmoor Battalion.

Among the many tablets in St. James's Church at Delhi, one finds only the names of the following having any medical interest:—

Assistant-Surgeon William Boyle Chavasse is memorialized on a large tablet erected by their surviving comrades to the memory of nine officers and one hundred and eighty-eight rank and file of the 2nd European Bengal Fusiliers, who died during the siege or at

the capture of Delhi. Chavasse was born January 8, 1833, and entered the Medical Department of the Bengal Army in 1856. He was sent to take charge of the 2nd European Bengal Fusiliers at Sabathu, and with that corps joined the field force before Delhi, soon after the mutiny broke out. He served throughout the siege, but, at the end, his health had completely broken down. Going to Meerut for a change, he rapidly became worse and died at that place from consumption on November 2, 1857.

Assistant Apothecary Thomas Bartholomew Corbett, belonging to the subordinate medical department, was, with his wife and daughter, massacred on May 11, 1857, and their names are recorded on a tablet in the same church. Similarly, on another tablet one finds the following inscription: "To the memory of Doctor Chimmun Lal, sub-assistant surgeon of Delhi, a native Christian and a worshipper in this church. He was admitted by the chaplain in company with another convert from Hinduism on July 11, 1852, and fell a martyr to his faith on the day of the massacre of Christians in Delhi on May 11, 1857." I have been unable to glean further details of these men.

On the Mutiny Memorial upon the Ridge there is the name of but one medical officer; it is that of the following :—

Assistant Surgeon Stuart Moore entered the service in 1851, and was at once appointed to the 6th Dragoon Guards, which he joined at Dublin, moving later to Canterbury and Ipswich. In 1854 he went with the regiment to the Crimea and was present at the battles of the Alma and Balaklava, also through the siege of Sevastopol. He returned home with the regiment in 1856, and within two months re-embarked with it for India, where they were first sent to Meerut and quartered there on the outbreak of the mutiny in May of 1857. Subsequently the regiment joined the field force before Delhi, and during the action on the Hindun River on May 31 Moore was severely wounded, from the effects of which he died on June 2, 1857. Moore was buried at Meerut, and his grave is near the west gate of the cemetery in that cantonment.

Dera Ghazi Khan.

I visited the cemetery at this old frontier post in 1899, but could find no graves or memorials to medical officers. However, I found the grave of an uncle and that of the son of a medical officer. It is regrettable to have to say that, owing to the inroad of the River Indus, the cemetery and whole cantonment have been washed away, leaving now nothing of the past.

Captain Marcus Richard Somerville was the elder brother of the man of the same name referred to among the graves at Delhi. This Somerville entered the Bengal Army in 1841, and joined the 61st N.I., with whom he served at various places till the spring of 1859, when he was appointed to the 1st Sikh Infantry. As second in command of that corps, he served in the operations on the Nepal frontier, and ultimately marched the regiment to Bannu. Soon afterwards he was given command of the 3rd Punjab Infantry, which he joined at Dera Ghazi Khan in February, 1861. He died there on September 3, 1862. There is a memorial tablet to him in the church at Kohat.

Lieutenant Arthur Sandeman Stephen was the only son of Surgeon-Colonel Arthur Stephen, of the Bengal Medical Department. He joined the Royal Fusiliers at Dover in March, 1891, where the writer knew him. Later, he joined the other battalion at Quetta, but went to the Indian Army in 1894. Within a year he was transferred to civil and political work, being sent to act as assistant commissioner at Karnal. Early in 1898 he was posted to Dera Ghazi Khan, where he died on March 22, 1898.

(*To be continued.*)

TROOPING SEASON 1914-1915: A FEW NOTES.

By Major J. B. ANDERSON.
Royal Army Medical Corps.

In the Journal of the Royal Army Medical Corps of last October some notes were given for the last trooping season. As they appear to have been appreciated I submit similar notes, somewhat amplified, in the hope that they may continue to be of some assistance to those officers about to embark. I give them under three separate headings.

(1) Outward and Homeward Voyages.

Vaccines and Serum.—Each transport is supplied with twenty phials of antidiphtheritic serum and fifty tubes of vaccine lymph. These are kept in the cold storage room on board until required. As an instance of not bearing this in mind, a medical officer reported he had no antidiphtheritic serum for a case on board after taking over and signing for it. If there is any doubt about not being able to find what one requires, it is always advisable—after questioning the Royal Army Medical Corps non-commissioned officer of the permanent staff—to refer to the "Notes for Guidance of Medical Officers in Charge of Hired Transports," a copy of which is placed in the hospital of each vessel, or to approach the troop officer, who is a ship's officer. Under his charge is a certain amount of medical equipment and outside his duties he "knows the ropes." The medical officer of an Indian trooper fares better than his brother officer on a colonial transport, as the latter does not possess a permanent Royal Army Medical Corps staff, consequently the non-commissioned officer embarked is always, comparatively speaking, new to his duties.

Isolation Hospital.—There is one on each transport. It may be used for any infectious disease (except tubercle) and diseases due to the animal and vegetable parasites, which may occur during the voyage, and for all classes of passengers, including the crew, both native and otherwise. Tubercle cases are very seldom embarked at home, and those from India are embarked only on the "Plassy," on which there are special wards for men and women.

Surplus Accommodation for Sick.—In the event of the swinging cots in the troop hospital all being occupied there are ample sling cots on board in charge of the troop officer. This still does not seem to be always realized.

Children under Two Years of Age.—Such children are not entitled to any accommodation. To obviate the discomfort of a mother having her child to sleep with her, there is a limited supply of small cots, which hook to the outside of the bunks, and in them children are perfectly secure. They can be taken down, folded up, and put away in the mornings and have been a boon to many mothers, who prefer them to any form of cradle they may bring with them.

Women employed as Nurses on Board.—A mistake is sometimes made in promising women passengers remuneration for nursing, in excess of what the regulations allow. On one occasion two women on a transport were each promised five shillings a day for nursing a case, but they afterwards received only one shilling a day in accordance with article 919 of the pay warrant. The wording of this article is somewhat ambiguous, and might lead one to conclude that only one woman was entitled to payment. The pay authorities took this view, but finally waived their objection. On Indian transports there are two stewardesses; they form part of the crew complement, and are not under the orders of the medical officer. Their duties are to assist ladies, women and children when settling in their cabins and quarters, and generally to look after their comfort, especially those who are sea-sick.

"*Notes for Guidance on Outward or Homeward Voyage.*"—Any prospective medical officer in charge of a hired transport can be furnished with this pamphlet by applying to the Embarking Medical Officer, The Docks, Southampton.

(2) Outward Voyages only.

Instruction to Troops.—Besides the routine duties and usual inspections, certain lectures have to be given during the outward voyage. Pamphlets are placed on board all transports, viz: "Hints on the Preservation of Health in India," "Precautions against Enteric Fever in India," "Hints on the Management of a Child's Health in India," and "Instructions regarding the Prevention of Venereal Diseases." Medical officers have to explain these pamphlets to all troops, etc., during the voyage. With regard to medical inspections for venereal disease, it is laid down in "Instructions for Guidance of Officers arriving with British Troops at Bombay and Karachi" (published by authority, 1913), that these inspections will be carried out on embarkation, seven days thereafter, and a third time before arrival. A report of these inspections has to be handed over personally to the assistant

director of medical services on arrival for transmission to the War Office.

Antityphoid Inoculation.—When the first dose has not been given prior to embarkation, both doses can be given on board, provided the first dose be given at least fourteen days, and the second, say, four days before disembarkation. Nominal rolls are placed on board of men who have received their first inoculation; before departure from their station, it is unnecessary for medical officers to send the vaccine for the second inoculation, which may still require to be done, for enough vaccine, together with the necessary pink slips, is placed on each transport to inoculate six hundred men with their first and second doses.

Sterilized Milk.—Officers or their wives still go to the unnecessary trouble of ordering, or bringing with them to Southampton, sterilized milk for their children. There is a plentiful supply at the embarking shed, and it can be relied on, as its preparation is under supervision, and its cost is moderate; single bottles cost 4½d. per quart, and a refund of 2½d. is made on each empty bottle. Any amount can be bought and no charge is made for packing.

Baggage.—Motor cars are absolutely prohibited. None have ever been placed on board to my knowledge. A motor cycle may be taken if there is room for it in the hold, and provided a certificate be furnished stating that there is no petrol in the tank. It must be properly packed. Grand pianos are inadmissible.

(3) Homeward Voyages only.

Lunatics.—Officers very often find it necessary to employ attendants on lunatics, in which case only two are allowed per lunatic. This number is often exceeded. As an instance, one season as many as twelve attendants were engaged to look after three lunatics, and when the paymaster said he could only pay six, it caused so much discontent that the medical officer made up the difference. These attendants must not be confused with the guard over the lunatics. The latter is purely for guard duty and gets no remuneration, whereas the attendants look after the patient day and night, dressing, bathing, feeding him, etc.

The disposal of lunatics on arrival does not appear to be generally understood. Officers, unless their parents are ready to take them over on arrival, are sent to Netley. All soldiers proceed to Netley. The embarking medical officer arranges for women to be taken over locally by the relieving officer. If their husbands or parents wish to take charge of them, they can do so, provided they realize their responsibility and have previously made

arrangements for the care of the patient, which must be to the satisfaction of the embarking medical officer.

Infectious Cases.— The outbreak of infectious diseases, especially measles and chicken-pox, occurs more frequently on board ship than might be supposed. The routine adopted for the disposal of such cases on arrival at Southampton is as follows: Soldiers are sent to Netley. Women and children are admitted to the Isolation Hospital at Southampton, where they are treated at Government expense. Women and children suffering from tuberculosis are sent to their homes. If unable to travel they are admitted temporarily to the Sanatorium at Southampton.

The responsibility of thoroughly disinfecting the clothing, etc., of direct contacts before disembarkation rests with the S.M.O. of the transport.

With regard to the disposal of contacts an infected troopship is treated in exactly the same manner as a private steamer by the port health authorities, i.e., the M.O.H. sends out notices by post to town and district M.O.H's. to keep under observation contacts proceeding thither. In addition the embarking commandant at Southampton sends out to all G.O.C.'s, etc., concerned, telegrams stating what troops, furlough men, and unaccompanied families are proceeding to their command, with time of arrival, and adding to the wires, "Keep under observation (measles, etc.,), last contact (date)." This often necessitates a large number of wires being sent all over the United Kingdom. Sometimes furlough men and unaccompanied families proceed elsewhere than to the addresses they have given.

It might be mentioned that on arrival off Netley the M.O.H. or his representative boards the vessel and requires the names and addresses of all infectious cases and suspects, which include also cases of tubercle amongst invalided officers and others.

Hints to Officers.—As officers disembarking are invariably not posted to a station, they are considered as on leave until they receive instructions from the War Office as to where and when they are to join for duty. Being on leave they are not entitled to railway warrants, but they are entitled to such warrants from the place where they may be on leave to their new station. For this warrant they should apply to the head-quarters of the command to which they are posted, as the moment they leave the transport on leave they, *ipso facto*, cease to be in any way under the jurisdiction of the embarking commandant. If the cost of the railway warrant for the journey from the place where on leave exceeds the cost of a

direct journey between Southampton and the new station, the difference has to be paid by the officer, and if less there is no claim on the officer's part for the difference, the public being the gainer.

Baggage.—All officers disembarking are responsible for the collection of their baggage, clearing it through the Customs, and for its removal from the trooping shed. All charges incurred through the employment of an agent on this account, except agency charges, are admissible against the public for the regulation quantity of baggage, and should be recovered on a travelling claim (A.F. 01771). Agency charges are only admissible when the officer is prevented by military duty, e.g., accompanying the sick to Netley, when he ought to get a certificate signed to this effect by the embarking commandant or officer in charge, Netley. When an officer is not posted on arrival home and his baggage is consequently stored, he should claim for storage up to the time he receives orders to join his new station. I state this advisedly, as there is no hard-and-fast regulation under which the claim would be admissible at first sight without any question from the financial authorities. It is, however, well within the spirit of the allowance regulations that all legitimate out-of-pocket expenses incurred by officers in connexion with their regulation quantity of baggage when travelling on duty are payable by the State. The storage of baggage while on leave, and not in receipt of lodging money, is clearly legislated for by para. 274 (b) *ibid.*, under which a G.O.C. can approve of the cost of such storage. Consequently there should be no great difficulty in getting the approval of a G.O.C.-in-C. of a Command for the payment of charges for the storage of baggage in such circumstances. All regulation travelling expenses are now granted to officers from the port of disembarkation (para. 300 (A) A.R. (Army Order [18/1913]). An officer comes home on duty, and as he is not posted, he has no other alternative but to store his baggage until he is ordered to a station. For consigning military baggage by rail, Army Form P. 1904, which can always be obtained from the disembark-office, should be used, otherwise full civil rates are levied. Baggage is not disposed of by the disembarkation staff. If an officer does not wish to employ an agent, he should apply to the dock company's representative, who will take over his baggage and consign it; but in this case he should remain until all his baggage is landed and personally clear it through the Customs.

Arrival Reports.—It is very necessary that offices should report their arrival home on the blue official forms supplied to every transport for the purpose.

Clinical and other Notes.

A CASE OF ANTHRAX.

By Captain J. A. BENNETT.
Royal Army Medical Corps.

The following short account of a case of anthrax (malignant pustule) may be of interest by reason of the rarity of the disease itself, and the mystery surrounding its origin.

As orderly medical officer on March 22, 1914, I was called to see a rifleman of seventeen years' service, who had reported sick, complaining of "pain in his chest" of one day's duration.

On arrival at the Military Hospital, Cork, the man was in a collapsed state, temperature 97° F., pulse 90, soft and regular, and respirations hurried. Situated over the manubrium sterni was an angry, inflamed brawny area about an inch and a half in diameter, in the centre of which was a small red spot, in appearance not unlike the bite of an insect, and surrounding this spot minute vesicles arranged in irregular rings. The skin over the front of the chest as far as the nipples and extending an inch above the clavicles was inflamed, and there was marked œdema all over this area. The patient complained of great pain in his chest at this time and the inflamed area over the manubrium sterni was tender to touch, and also hard and brawny.

The patient stated that until the day of admission he felt well—even the day before he was actively employed—and that he noticed the spot the day before for the first time, but thought nothing of it, as there was then no discomfort beyond some itching. On the day of admission he felt rather "seedy," and finding himself getting worse he reported sick.

The history gave no clue, so I acted on the suggestive appearance of the "inflamed vesicular area, arranged in irregular rings, with the central red spot," together with the patient's grave condition, and came to the conclusion that the case was one of anthrax. I endeavoured to obtain serum from the little vesicles, but could not manage it, so used a hypodermic syringe and succeeded in withdrawing a drop or two of bloody serum from the centre of the pustule. Four slides were made and stained with watery methylene blue, and with the invaluable assistance of Major R. W. Clements, R.A.M.C., *Bacillus anthracis* was found (a culture was prepared on agar at the same time). The question of excision was fully considered, but not deemed advisable owing to the extent of the inflammatory œdema as described. No *Sclavo's anti-anthrax serum* was available, but steps were taken to procure it.

The treatment at once adopted was, locally, injection of 1 in 1,000 perchloride of mercury, round the circumference of the pustule in

six places, the needle pointing to the centre of the pustule. The injection caused great pain owing to the tissues at the site of the injections being already brawny and tense. Hot carbolic compresses were applied. The treatment by injection of perchloride of mercury was repeated in a few hours and the hot fomentations continued.

The general treatment consisted of measures to combat shock, stimulants, and readily assimilable food, an ounce of champagne every hour, injections of ether and strychnine (the latter ♏v four-hourly), meat extract, hot bottles, and the like. A *soporific* was given. The temperature rose to 102° F. in an hour.

The night report showed that patient had slept badly, although his pain was less. The general condition was worse. The upper limbs were cold, and the pulse was absent at the right wrist. Temperature 101° F. General treatment continued.

The appearance was now classical. The centre of the pustule became a dry dark reddish-black slough, in the centre of which was a small bulla containing bloody serum; outside the slough was an irregular wreath of tiny vesicles and the tissues in the immediate vicinity formed an inflamed brawny indurated mass. The surrounding tissues were swollen and indurated, as were the cervical and axillary glands to a lesser degree. Cover-glass preparations made from the serum in the centre of pustule showed long chains of *B. anthracis*. A second culture on agar was prepared. The patient was quite intelligent and rational and stated that his pain had gone. Throughout the day the patient became progressively weaker and saline infusions were given; but all measures to prolong his life were without avail and he died early next morning, thirty-seven hours after admission.

From the serum in the pustule a typical thick slimy growth with a granular appearance and wavy outline was obtained on an agar plate. From this plate cover-glass preparations were stained by Gram and found to be composed (Gram-positive) of the usual long segments with sharp-cut ends. Cover-glass preparations were also stained for spores, and many well-marked ovoid spores were seen. A seven days' culture showed a typical "fir-tree" growth.

For this bacteriological report I am indebted to Major N. J. C. Rutherford, R.A.M.C., specialist sanitary officer, Cork District.

In such cases, treatment to be of any use must necessarily be speedily carried out, and for diagnostic purposes the cultivation test is of course useless, for no one would be justified in leaving a supposed anthrax case untreated until a growth was obtained. It seems sound to base the diagnosis on the appearance of the local injection, together with the history—which in this case threw no light. One of course ought to examine the serum from a pustule (or rather the condition which may be a malignant pustule) for *B. anthracis*, but as a matter of fact it is not so easily found (in my case I was fortunate in having such able help).

Even the excised lesion, when examined microscopically, may not show *B. anthracis*, although it is readily enough cultivated.

Nothing could be gathered to throw any light on the origin of this infection. The patient was very definite in his statement that he had not handled any hides, animals, or leather of any description; he had not been out of Cork for months, and for over six months had been working and sleeping in a small company-store with another man. The patient also stated that he had no recollection of any abrasion to the skin over his chest. The situation of the pustule was curious, too, as the area is so well protected and not liable to abrasions.

A MODIFICATION OF NEVELLE'S BACK SPLINT.

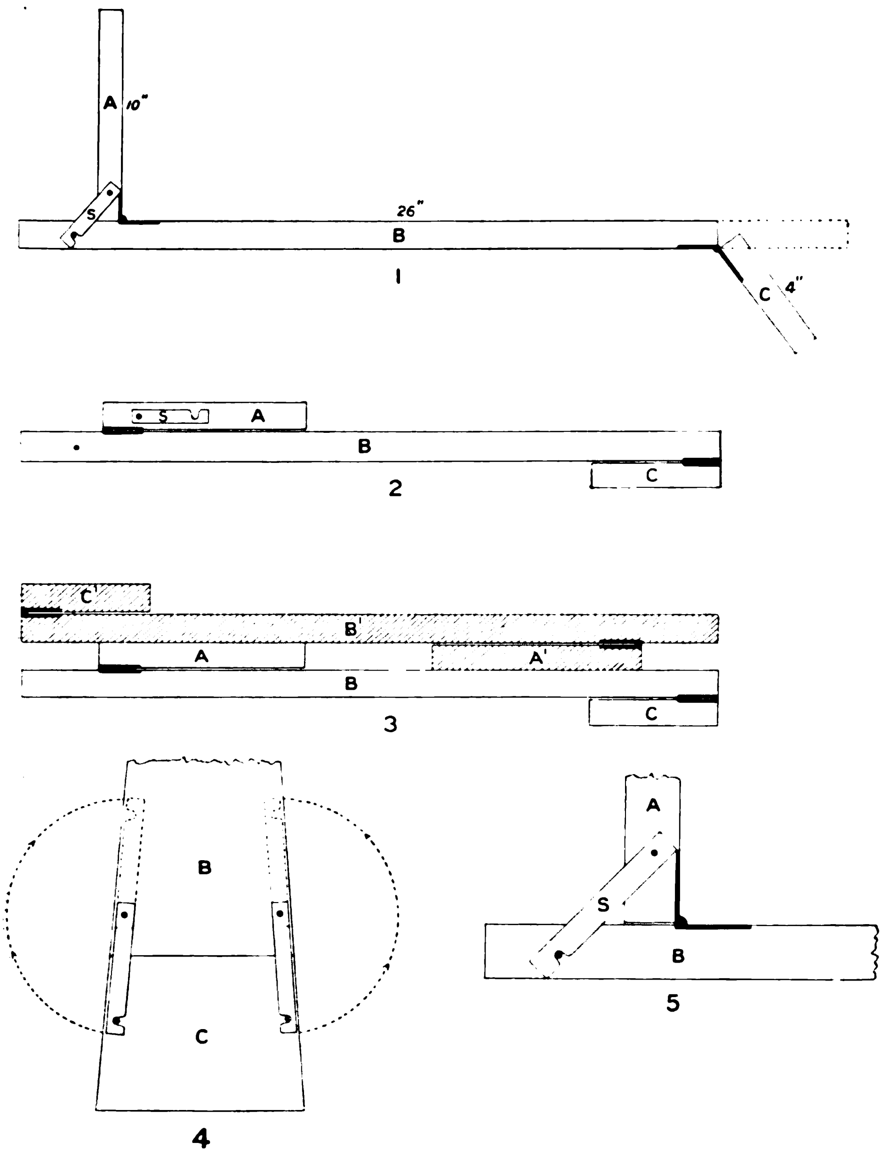
By Lieutenant J. E. HEPPER.
Royal Army Medical Corps.

I would suggest that the modification of Nevelle's back splint, which I am about to describe, is an improvement to the double inclined plane at present carried in the field fracture box.

It is an ordinary Nevelle's splint with two modifications: (1) The foot-piece is collapsible, thereby making the splint portable. (2) The last four inches of the upper end are hinged so as to bend right back and thereby shorten the splint. By this means the splint is adjustable to various lengths, and will suit any leg.

Fig. 1 shows the splint set up ready for use. The foot-piece is hinged on to the main portion of the splint, and is held in the upright position by the pressure of the foot and the thickness of its own base, the hinge being on the side on which the foot rests. It is further locked in that position by the brass strap "S." (*See* also fig. 5.) Fig. 2 shows the splint packed up ready for carriage. Fig. 3 shows how these splints can be packed, one fitted into the other. Fig. 4 shows the method of fixing the adjustable portion when the full length is required. When the short length is required the straps are swung round, taking up the position shown by the dotted line. Fig. 5 shows the method of locking the foot-piece.

My splint is made of wood and weighs 2 lb. 13 oz. as compared with the double inclined plane which is made of iron and weighs 4 lb. 2 oz. It is also fitted with transverse pieces for slinging. When not in use these pieces are turned round, taking up a position underneath the splint. I recommend the splint as it is not only portable but adjustable, and would suggest that it would be extremely useful if carried in the field fracture box.



A modification of Nevelle's Back Splint. A, foot-piece; B, body of splint; C, adjustable portion of body; S, brass strap for locking foot-piece.

A NOTE ON A TYPHOID-LIKE BACILLUS ISOLATED FROM A BLOOD CULTURE.

By Major A. H. SAFFORD.
Royal Army Medical Corps.

The following description of a bacillus very closely related to *Bacillus typhosus*, which was isolated from a blood culture, may be of interest.

The specimen was received from Dinapore at the 8th (Lucknow) divisional laboratory on May 30, 1913—source, blood—and was plated on June 1. The appearance on a Conradi Drigalski plate was a mixed culture with some colonies typical of the typhoid group. Replated from a single colony, June 2, 1913. Morphologically the organism was a Gram-negative, motile bacillus, which failed to agglutinate with sera of *B. typhosus*, *B. paratyphosus* A, or *B. paratyphosus* B.

There appeared to be very slow and feeble agglutination with the first two sera on first examination, but no true agglutination with either serum was subsequently obtained.

Biochemical Reactions.

	24 hours	48 hours	10 days
Glucose	Acid + Gas −	Acid + Gas −	Acid + Gas −
Lactose	No change ..	No change ..	No change
Cane sugar ..	No change ..	No change ..	No change
Mannite	Acid + Gas −	Acid + Gas −	Acid + Gas −
Dulcite	No change ..	Acid ± Gas −	Acid + Gas −
Adonite	No change ..	No change ..	No change
Inulin	No change ..	No change ..	No change
Neutral red agar ..	No change ..	No change ..	No change
Litmus milk ..	Acid + Clot −	Acid + Clot −	Acid + Clot −
Indole	*Nil*	*Nil*	*Nil*

Absorption Test.—Absorbed with both typhoid and paratyphoid sera; agglutinins were not removed. This test was repeated on several occasions with the same result.

A capsule full of the patient's blood was obtained and gave the following result:—

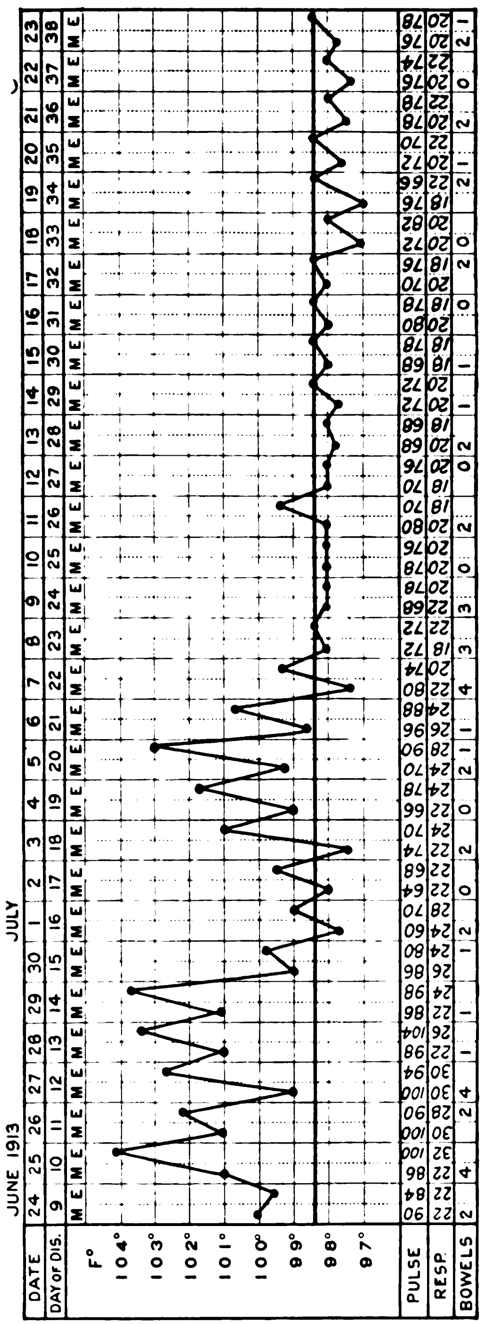
Widal Results.

B. typhosus		*B. paratyphosus*		Isolated bacillus
1—20 +	..	1—10 +	..	1—10 +
1—40 ±	..	1—20 +	..	1—20 +
1—100 ±	..	1—100 ±	..	1—40 +
				1—80 ±
				1—100 ±
				1—200 −

The patient had been previously inoculated against typhoid.

It will be noticed that the bacillus gave the typical typhoid biochemical reactions, but failed to agglutinate with the serum, or to remove the agglutinins on absorption.

The case was returned as "pyrexia of uncertain origin" and the patient was eventually transferred to the enteric convalescent depot,


DATE
DAY OF DIS.
JUNE 1913
JULY
F°
104°
103°
102°
101°
100°
99°
98°
97°
PULSE
RESP.
BOWELS

Naini Tal, where daily examinations of his urine and fæces were made, but neither Major Grattan nor I were able to recover a similar bacillus or one of the typhoid group. As I was shortly returning to England I brought a subculture with me and handed it to Major S. L. Cummins, professor of pathology, Royal Army Medical College, who kindly undertook to examine the strain. He has sent me the following notes (N.B.—I have substituted *B.* "*X*" for *B. Safford*, the name given by Major Cummins in his notes):—

"(1) Absorption test (carried out by Captain Coppinger), A.T. serum (B. W. and Co.), diluted 1 in 10 absorbed with three slopes of *B.* "*X*."

"Agglutinations:—

B.T. "*X*"	1—20	Negative	18 hours at room temperature.
	1—50		
	1—100		
B.T. Eyre	1—10,000	+	

"Your bacillus does not remove the agglutinins for *B. typhosus* from a specific serum.

"(2) A rabbit immunized with your bacillus does not agglutinate *B. typhosus*. This was tried twice. The serum of the first animal agglutinated neither *B.* "*X*" nor *B. typhosus*, so the immunization was repeated. The test, carried out last week, showed that the serum agglutinated *B.* "*X*" (partially) up to 1 in 50 and had no agglutinating effect on *B. typhosus*.

"(3) On keeping the culture *for some weeks* cane sugar was acidulated by *B.* "*X*."

"(4) *B* "*X*" is not opsonized by a heated anti-typhoid serum.

"I therefore conclude that your bacillus is not *B. typhosus*. The fact that it was isolated from the blood gives it a decided interest and I should advise your publishing a note on it in the Journal."

The original culture was evidently contaminated, so that it cannot be claimed that the bacillus was undoubtedly isolated from the blood, and this detracts considerably from its importance, but the fact of a bacillus so very closely allied to the typhoid group having been isolated, presumably from the blood, is of the greatest interest, and owing to the fact of its failing to agglutinate with either serum it will be necessary in future not to rely too much on this test when examining cultures, especially those from urine or fæces, as it is probable that some of the fevers in India, the cause of which is at present unknown, may be due to this or similar bacilli.

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CLINICAL NOTES FROM MILITARY FAMILIES' HOSPITAL, PORTSMOUTH.

By Captain E. L. MOSS.
Royal Army Medical Corps.

Case I. Pregnancy and labour, complicated by double mitral disease and abnormal presentation.—Mrs. S., wife of a private in the Royal Marine Artillery, aged 25, two children, was admitted at the thirty-fourth week of pregnancy on account of her cardiac condition. On examination she was found to have double mitral disease, with considerable dilatation, cyanosis, dyspnœa, and a pulse irregular in rate and volume. There was a history of rheumatic fever soon after the birth of the last child.

The point to be decided was whether this was a case to be treated expectantly, with rapid delivery at term under general anæsthesia, or whether Cæsarean section under spinal anæsthesia was warranted. Expectant treatment was chosen. During her stay in hospital she had several attacks of acute dyspnœa, but on the whole her condition improved somewhat. Labour commenced on the expected date. On examination immediately after rupture of the membranes the cord was found prolapsed, but pulsating strongly; the face presented incompletely extended in the first position (right mento-posterior). The gloved hand was introduced into the vagina and the cord pushed up above the presenting part. The patient was then placed in the genu-pectoral position, pending preparations for anæsthesia and delivery.

Anæsthesia was maintained with chloroform and open ether. Dilatation of the os was completed manually. The head was further extended and the chin rotated to the front and held in position whilst axis traction forceps were applied. The child was quickly delivered without laceration of the perineum; it was in a state of white asphyxia, but soon revived under artificial respiration carried out in a bath, at a temperature of 105° F. Three minims of ether were injected hypodermically. The further progress of mother and child was normal and uneventful.

Case II. Embryotomy *versus* Cæsarean section.—Mrs. W., wife of a corporal in the Royal Marine Light Infantry, *primigravida*, admitted at the thirty-fourth week of pregnancy. In stature a dwarf, with multiple signs of rickets. Pelvimetry contra-indicated the birth of a viable child, the pelvis being of the small, round, generally contracted type. Examination by "Müller's impression" method revealed the head floating above the brim and no engagement possible.

Embryotomy had the following disadvantages: The mother desired a living child. Future pregnancies were probable with a recurrence of risks and dangers, possibly abroad, and out of reach of hospital treatment. Cæsarean section, besides giving a living child, gave an opportunity of rendering the woman sterile, which in this case was thought advisable.

Cæsarean section was performed at full term on May 2. Anæsthesia, by means of chloroform and then open ether, a hypodermic of a quarter of a grain of morphia being previously given. Incision, paramesial. The placenta was found situated in front; an attempt to deliver the child through the placenta was quickly abandoned, and the placenta was removed first without any trouble: the child was delivered a moment later. No difficulty was found in establishing respiration.

The uterus was closed by Sanger's method with silk sutures. Portions of both tubes were removed. Bleeding was controlled by manual pressure of the uterus, wrapped in hot wet towels. The abdomen was sewn up in layers, the skin closed with Michel's clips, supported by a few silkworm-gut sutures to take the tension off the clips. One cubic centimetre infundin was given intra-muscularly, and a rectal saline injection on return to bed. The mother suffered very little from shock, considering that rather more blood than usual had been lost owing to the anterior situation of the placenta. The child was a lusty female, and was bottle-fed, as the mammary glands of the mother did not show the slightest sign of activity.

Case III. Amenorrhœa and thyroid.—Miss X., aged 21, nullipara, gave the following history: Since the onset of menstruation at the age of 16, the periods never lasted more than two days and amenorrhœa frequently went on for three or four months at a time, but the menstrual molimena were present in varying degrees of severity at irregular times, mastodynia being a prominent symptom. She suffered from obvious lassitude and depression. Several courses of different kinds of treatment for "anæmia" had been tried. Change of climate had no effect. When the patient first walked into the room, slight asymmetry of the neck in the region of the thyroid was noticed; the right lobe was found to be somewhat enlarged. Calling to mind a paper on "Internal Secretions and Female Characteristics," read by Dr. Blair Bell at a recent meeting of the Obstetrical and Gynæcological Section of the Royal Society of Medicine, it was decided to try the following treatment. Thyroid extract three grains was ordered to be taken at bedtime, commencing on the twenty-fourth day of the cycle, and continued until the function was well established each month. The result was rather striking, for since commencing this treatment menstruation has been quite regular for the last three months, and for the first time in the patient's life; moreover the general condition of slackness has markedly improved.

Case IV.—In this external pelvimetry was misleading.—Mrs. S. (husband in Royal Marine Light Infantry), aged 27, *primigravida*. First note in case-book. April 1.—"Large stout woman; measures, intercrestal, 11½ in.; interspinous, 10½ in., external conjugate, 8.

Noted a slight depression just above and to right of sacrum; on internal examination however the promontory could not be felt. Fœtal head at brim, but amount of engagement difficult to gauge owing to obesity.

Second note.—May 20.—Podalic lie, head in right hypochondrium. External version attempted, but failed, owing to tenseness of abdomen, and uterus contracting strongly on manipulation. On remembering the depression above noted it was decided not to persevere in a further attempt at version, since if any flattening existed the lie might be favourable rather than otherwise.

Labour notes.—May 26.—Labour commenced at 2 p.m. At 6 p.m. membranes ruptured and right foot presented. After birth of the breech and legs, it was found that the head and extended arms were impacted at the brim. Pulsation in the cord was very feeble. Chloroform was at once given, the arms brought down with difficulty owing to the large size of the child, and the contraction found at brim. It was quite impossible to get the head through. The pulsation in the cord ceased and craniotomy was performed. The crushed head was delivered after much difficulty. There was now an opportunity of examining the brim; the true conjugate measured just under 3 in. and there was very little room at either side of the promontory. The child weighed 10¾ lb.

SURGICAL NOTES.

By Major P. Evans.
Royal Army Medical Corps.

Private G. E., aged 17.—Separation of the lower epiphysis of the right femur backwards.—Patient stated that on September 29, 1910, whilst at gymnastics he was ordered to jump a pole, and that he slipped and struck the pole with his knee. He was transferred from an out-station twelve days later, and on admission to hospital at Devonport on October 10 the knee was seen to be much enlarged with a marked depression below the patella. He was unable to extend the knee, keeping the joint slightly flexed. The nature of the injury was not diagnosed. An attempt to extend the joint was made with a weight extension. The patella moved laterally over a rough surface. On the 11th the knee was less swollen, but the tibia was displaced backwards. On the 14th he was examined under chloroform. The knee was flexed and extended and adhesions broken down; the leg moved on the femur more than normally. No separation of the upper epiphysis of the tibia was discovered. A tentative diagnosis of rupture of the crucial ligaments was made. On 17th an X-ray negative disclosed a separation of the lower epiphysis of the femur with the diaphysis pointing forwards. Under chloroform on October 18, the deformity was reduced by placing a sand-bag under the leg, with its upper border reaching to the patella. One assistant made extension just above the ankle, another assistant grasped and steadied the condyles, pressing them forwards, whilst the operator put his whole weight on to the shaft of the femur and pressed it backwards. An X-ray

FIG. 1.

FIG. 2.

To illustrate "Surgical Notes," by Major P. EVANS, R.A.M.C.

was taken on the 19th after the operation and showed that the reduction was satisfactory. The leg was placed on a back splint and extension applied to the tibia.

On November 26 the limb was put up in plaster; firm union in good position followed. The plaster splint was removed on December 8. On December 20, the leg was moved under gas, and adhesions were broken down. It was again moved under gas on December 28 and January 14. He was discharged on February 4, when he could flex his leg to a right angle, and walked with a limp, but the position of the bone was excellent. He should in time have complete movement.

This is a rare condition, the usual separation of the epiphysis being forwards, the diaphysis injuring the popliteal vessels. The epiphysis joins the shaft at 20 years of age.

The effusion into and around the joint made the diagnosis by ordinary examination impossible, even when the nature of the injury was made known by the X-rays. The point which would make one suspect the injury on another occasion was the patella moving over a roughened surface (namely, the point of the diaphysis).

I am indebted to Corporal Baiden, R.A.M.C., for the X-ray prints.

Travel.

GLIMPSES IN THE NETHERLANDS. SEPTEMBER 3 TO 10, 1913.

By Colonel J. M. BEAMISH.

Two hours in the 9 a.m. Dover express from Charing Cross, followed by three in the Continental mail packet, with a fresh north-easter causing no more than a rippled sea, and a hot sun breaking occasionally through drifting clouds, bring in sight the sombre blocks of buildings lining the shore at Ostend and looming out of their stark loneliness a long distance at sea. Advantage is taken to break the afternoon journey to Ghent, at Bruges, by means of a train leaving Ostend town station about 3 p.m., and after a run of twenty minutes, admitting of a stay of two hours or more to inspect the sights of Bruges.

Bruges.—This town, the whilom residence of the Counts of Flanders, was in mediæval times one of the most wealthy and populous cities of Europe, largely engaged in the woollen trade, and reaching the height of its prosperity under the House of

Burgundy in the 14th century. Its decline set in under the House of Hapsburg, primarily through an act of vengeance brought upon themselves by the citizens and hastened by the silting up of its natural harbour—the Twijn—though in recent times an attempt has been made to restore communication with the sea through the deep water canal at Zeebrugge.

The modern deserted streets and general somnolence of Bruges are, however, redeemed by the glory of its ancient buildings, of which the following are the chief:—

(1) The Hôtel de Ville (14th century), typical of the Flemish town halls, with perpendicular window tracings, pointed roof and graceful finials.

(2) The Belfry,[1] Gothic, with a carillon of sweet chimes from forty-nine bells, used in mediæval times for calls to arms, alarms of fire, etc., and even now so used. It is from this vantage point that Longfellow gives rein to his imagination in his "Belfry of Bruges."

> "I beheld the Flemish weavers with Namur and Juliers bold,
> Marching homeward from the bloody battle of the Spurs of Gold."

This famous battle, originating in a trades dispute with the French Governor, was fought at Courtrai in A.D. 1302, in which the Flemings completely routed the French army—cavalry and infantry—and in which the flower of the French nobility, represented by 700 spurs, *one* by regulation to each knight, perished. The artisans and citizens, for the most part untrained in war, and armed with pikes bearing the motto "Seilt und Vrient" (shield and friend) and assisted by local knowledge favouring an ambuscade round a semi-circular wet ditch, stood up to, and bore down the chivalry of France—on this, however, reprisals followed.

(3) Churches, (*a*) the Cathedral of St. Sauveur (13th century), with admirable choir and ambulatory chapels containing pictures of the masters, Van Orley, Van der Goes, Van Oost, etc. (*b*) Notre Dame (12th century), containing marble tombs of Charles the Bold and Mary of Burgundy, pictures by Van Oost, Van Orby, Clæssens, etc.

(4) Several museums and statues, among them one of J. van Eyck, who discovered the art of painting in oils, and is represented by the principal portions of the famous "Adoration of

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[1] The Golden Dragon taken from the church of St. Sophia at Constantinople, in one of the Crusades, and placed in the belfry of Bruges, was afterwards transported to Ghent by Philip van Artevelde, and still adorns the belfry of that city.

the Lamb," in one of the chapels of the Cathedral of St. Bavon, Ghent, painted in 1432.

Ghent.—Population 210,000, is situated on the Scheldt, communicating here with the Lys, both rivers, by means of several canals, dividing the town into islets joined by sixty-five bridges. The Termensen canal, navigable for ships of large burthen, connects Ghent with the North Sea, but lies in Dutch territory. Industries are spinning, weaving, machinery and horticulture.

During the 15th and 16th centuries Ghent was the most important town in Flanders, and perhaps in Northern Europe. It has interesting historical associations, for here was born in 1500 the Emperor Charles V, and in 1340 John of Gaunt (Ghent), son of King Edward III of England. The Arteveldes, father and son, brewers or cloth-workers, as variously described, sided with the latter in his claim to the French throne against the Count of Flanders, but were ultimately sacrificed by the citizens, and their leader Philip Artevelde was killed in battle against the French in 1382, which year marks the decline of the heroic period of the Guilds in Flanders.

Chief objects of interest are:—

(1) The Hôtel de Ville, containing several apartments—banqueting hall, throne room, council room, all of fine proportions; chapel, now adapted to other use, salle de mariages, etc., among them some portraits of the Imperial family of Austria and the late Leopold I, King of the Belgians. The exterior is a compound of flamboyant Gothic and Renaissance.

(2) The Belfry,[1] with carillon and tower similar to those at Bruges. In the same context ("Belfry of Bruges") Longfellow continues:—

" And again the whiskered Spaniard all the land with terror smote,
And again the wild alarums sounded from the tocsin's throat;
Till the bell of Ghent responded o'er lagoon and dyke of sand,
'I am Roland! I am Roland! there is victory in the land!' "

(3) Churches, (*a*) St. Bavon Cathedral, adjoining the Belfry, with lofty tower—interior impressive from its height and rich decorations. There are some still unstained windows in the nave, but those in the choir are artistically arranged in three series of double V-shaped lights on either side, and this arrangement, which has a very beautiful effect in stained glass, obtains also in other churches visited. The

[1] The inscription on the alarm-bell at Ghent is, " Mynen naem is Roland; als ik klep is er brand, and als ik luy is er victorie in het land." " My name is Roland; when I toll there is fire, and when I ring there is victory in the land."

principal pictures besides that of J. van Eyck, "Adoration of the Lamb," above referred to under Bruges, are portraits of local bishops in settings of marble which have a highly decorative effect. The choir has also several massive brass candlesticks. (*b*) St. Nicholas—exterior much time-worn, Gothic with 15th century tower—has the credit of being the oldest in the town. Interior pillars are being renovated and restored where necessary to their original circular shape. This church is also lofty, but it has a comparatively contracted nave. (*c*) St. Michael—long nave with peculiarly bright interior—like all Flemish churches has paintings along the side aisles.

All these churches and secular buildings are centrally grouped, and reminiscent of the flourishing period of the Flemish guilds and communes in the 13th and 14th centuries. The communes, while mutually distrustful and self-interested, usually held the balance between the local counts and kings of France, their nominal suzerains.

Modern Ghent is a bright, clean, prosperous town, and a happy example of the blend of new ideas and improvements with its ancient history.

Between Bruges and Ghent extensive railway works are in progress with a view to elevation of the permanent way, and I understand they are in time to become general throughout Belgium, so obviating damage and inconvenience from floods—a great public utility.

Time limit on this occasion, over night up to noon the day after arrival, but within this interval gave but short shrift to Brussels; it was possible from a central position and previous knowledge of locality to take a cursory view of the principal sights of Brussels in the line of the Rue Rozah, including the Cathedral of St. Gudule, the park, Royal Palace museum, Palace of Justice, and town hall, and even linger for three-quarters of an hour over the masterpieces in the central galleries of the museum, and see Rubens and others "at home" in their imperishable records.

A delightful mid-day temperature on September 5 attended the departure from Brussels for Amsterdam direct—a journey of some five hours—with halt at Rosendal over the Dutch frontier for "douane" inspection. Antwerp was first passed and a "glimpse" obtained of the new fortifications, constructed 1860-70. The general flat character of the Netherlands is here varied only by the nature of the soil, which is more fertile and better cultivated than it is southward towards Brussels—willows, osiers, small lindens, some mountain ash and other brushwood meet the eye everywhere.

Northward again the peculiar canal systems and dykes of the country, windmills, etc., are more in evidence, till Holland Diep is passed with the island of Beijerland in view westward, thence Dordrecht on the Maas river, 3.50 p.m., Rotterdam 4.15, Haarlem 5.20, and a little later Amsterdam.

Amsterdam, the capital of Holland, with a present population of over half a million, is situated on the Y or Ij, a gulf of the Zuyder Zee. It may be described as a city enveloped by a series of concentric canals (4), abutting on the chord of an arc resting on the bay, each canal fringed with trees, along which again the streets are aligned, forming a number of aquatic boulevards. The large canals are, moreover, interconnected by smaller ones penetrating into every recess of the city. It is, therefore, a Northern Venice, only much more so, with a multitude of "grand" and subsidiary canals. The North Sea Canal, fifteen miles long, connects the city with the seaport town of Ijmuiden (lj-mouth) and is protected from the Zuyder Zee by a huge dam one and a quarter miles in length.

The New Church—rebuilt 1648—contains the mausoleum of De Ruyter, antagonist of Blake, a handsome carved pulpit and brass screen. It adjoins the Royal Palace, a square many-storied building standing in a central open space—the Dam—in front of the post-office.

The National (Rijks) Museum is a large modern building in the Dutch Renaissance style, erected 1877-1885, on piles, and so arranged as to house a number of collections formerly located elsewhere. The picture galleries are spacious and contain a wealth of 17th century masters—portraits of "William II, Prince of Orange," and his wife "Maria Henriette Stuart," by Van der Heist. Several large pictures representing naval actions between the Netherlands and Spain (Simon de Vlieger, September, 1613), Gibraltar (Adam Willcerts—no date), a third of Dutch merchantmen v. English at Bergen, 1665. Other noteworthy pictures are "Prometheus" (Theodor von Baber), "De Kinder Moord Te Bethlehem" (Slaughter of the Children), Von Haarlem, and the so-called "Night-watch" (Rembrandt), hung in a special salon, representing the departure of arquebusiers (sharpshooters) from Amsterdam under the leadership of Captain Korn—a remarkable colour-picture.

The anatomical pictures by various Dutch artists in the early 17th century are especially interesting. Some are now referred to:—

(1) "The Anatomical Lesson," by Aert Pietersen (no date).

(2) "Anatomische les" (= lesson), by Sebastian Egbertez, 1603, in which the lecturer is shown in the centre of a group holding open scissors, of which two or three others appear in the picture. There are 29 figures with white neck ruffs and black gowns, the "subject" supported by two assistants seated on chairs.

(3) Similar figures, faces life size, are grouped round a skeleton in the same room, and a fourth group represents a dissector with scalpel ready to operate.

"Inspectores van het Collegium Medicum" is the subject of another large painting by G. Twost (no date), in which a group of five or six, three with black upturned triangular hats, one erect, grasping a lifted wand, are assembled round a writing table, with patterned cover, supporting an inkstand and two open volumes, one resting in an inclined position on a third. Here also it is convenient to refer to an early Rembrandt (1632) "Professor Tulp's Anatomical Lesson"—now hung in the Mauritshuis Gallery at The Hague (of which more hereafter), which represents an operator lifting with forceps some tendons of the left forearm through an external incision, whereby the palmar flexor tendons are also exposed. In all eight, nearly life size, faces are shown—a highly realistic picture.

The Anatomical Paintings, by Rembrandt and others, in both the Amsterdam and The Hague collections call attention to the fact that these great artists did not consider the subject unworthy of their notice, thus reflecting the spirit of their age, in which both the medical and surgical arts must have occupied a prominent place in the public mind. We are too apt to think that the undoubted modern craving for medical knowledge in a popular form is entirely new, and in this modern appreciation of the great advances made in biology and the medical sciences proper, during the last and present centuries, there is a tendency to dwell too much on its demerits, due to imperfect knowledge, rather than on the real merits of the centuries previously elapsed. Read in this light the anatomical pictures of Rembrandt and his confrères, themselves exhibiting a high form of art, become a consecration of the medical art for all time.

The transition is easy—twenty-four miles—from the scene of Rembrandt's life-work (forty years) in Amsterdam, where he died in 1669, to Leyden, where he was born in 1607, and here an opportunity is afforded of acquiring first-hand knowledge of the structure and disposition of the great dykes and waterways of Holland by means of a four hours' circular trip by steamer leaving Veemarkt landing-stage at Leyden about noon. The course lies via the Old

Rhine Brassemirmeer and Kaagermeer lakes and Oude (old) Wetering (village on canal) back to the starting-point. At Wetering, about half-way, is seen on the right the Harlemmer Meer "polder," and further on on the left the Alkemade and Lijker "polder," both of which lie considerably lower than the surface of the canals passed through, and are now large tracts of fertile land rescued from the bottom of the sea and growing rich crops, cereals, wheat and oats, then just reaped, beet, beans and bulbs.

The drainage is effected by four pumping stations which lift the water into the canals for discharge into the Zuyder Zee by means of a large sluice at Amsterdam.

In a speech from the throne on September 17, at the opening of the States General, Queen Wilhelmina stated a measure would be introduced for the drainage of the Zuyder Zee, so as to form a new province!—a transformation which has already overtaken the Haarlemmer Meer.

There was no time to visit the University—an old (1575) institution still flourishing, especially its medical school. Two "glimpses" were, however, possible—one of the barges on the Old Rhine conveying turf (briquettes) from Friesland for town consumption—one street is named Turf Street, connecting us directly with the home of our ancestors. Another "glimpse" was also just possible before the Rhine boat started, namely, of the Lakhendal Museum, where the thrilling story of the siege and relief of Leyden (1573-4) is recounted in two large canvases on the ground and upper floors. The contestants were Spaniards under Valdez and burghers under Van der Werf, awaiting relief by the Prince of Orange. The scenes were very closely repeated a century later in the siege and relief of Londonderry (1689), and in both, curiously enough, princes of the House of Orange were principal actors.

The Hague, ten miles from Leyden, next invites a passing notice. It is by far the best place to halt on account of its general amenities, and, at the time of the writer's visit—September 6 to 8—its buoyant and exhilarating air. Within a comparatively small space it comprises many treasures of antiquity in its old town and Royal Palaces—shaded avenues, woods and waterways, seaside resort close by at Scheveningen, Willem Park, and Palace of Peace just erected.

The Royal Museum and Picture Galleries in the Mauritshuis contain the following, among numerous other Dutch paintings:—

Wouwermann (1614-1668)—a large battle picture.

Rembrandt—(*a*) "Saul and David," (*b*) Two "Ethiopian" Heads,

(*c*) "Susanna Bathing," (*d*) "Simeon in the Temple" (small), (*e*) "De rust op de Flucht naar Egypte" (halt during flight into Egypt), (*f*) The master's "Anatomical Lesson" (Tulp's) referred to above.

Paulus Potter (1625-1654)—"The Young Bull" (chef d'œuvre) —detail shows two large osiers, a male figure leaning on one, a ram, sheep, and lamb to left (= right) of principal figure (bull).

C. R. Birchem (1620-1683)—"Traveller attacked by Brigands."

Willem van Hœcht (1593-1637)—a composite picture.

Cornelis Cornelitz van Haarlem (1562-1638)—"De Kinder moord te Bethlehem" (massacre of the children—also in the Rijks Museum—*vide supra*).

J. Yermeer (1632-1675)—"View of Delft."

B. E. Murillo (1618-1682)—"Virgin and Child."

Foreign—Two of Giordano (1632-1705)—(*a*) "Prometheus and the Vulture," (*b*) "Sisyphus."

The Hague was *en fête* September 5 to 6 in commemoration of the first centenary of Dutch Independence.

The Haagsche Bosch, in a shady forest three-quarters of a mile from the town, was visited under favourable circumstances during a Sunday afternoon, the military band performance lasting an hour and a half. Admission is only by an introduction from the "Litteraire Societat," and general society at The Hague was here seen at its best. The public also got the benefit of the performance in shaded ground outside the Pavilion and seated enclosure. Refreshments were served on payment.

Rotterdam.—At 4.40 p.m., September 8, Leyden was left for Rotterdam, which was reached before 6 p.m. First impressions of a large commercial city under glowing skies were not favourable, but on closer inspection the wharves were imposing and the sight of a brisk, if not hustling, trade made amends for an inconvenient crowd. The bourse and other buildings near the Boomjes—so-called linden trees—overlooking the harbour are marred by the proximity of a high-level railway, but in other directions the streets are regular if narrow in places, well lit at night and thronged with people. The Groote Kerk (St. Lawrence), fifteenth century, is imposing from its size, but neither in its inner nor its outer aspect is it a model of twentieth century sanitation, and the same may be said of other "Reformed" churches in Holland. The interior is divided by a brass screen, otherwise but poorly decorated except for one presentation window. The church is said to have suffered defacement during French occupation.

Bozman's Museum contains a number of Dutch and Flemish

paintings, only one by Rembrandt (van Rijn)—an undeveloped sketch meant to commemorate the Peace of Westphalia, 1648.

The passage homeward from Rotterdam to Harwich via "The Hook" was quite uneventful, though some hours before the voyage, 12 midnight to 6 a.m., it was quite possible we might have been in the wake of the gale which wrecked Zeppelin L1 in the North Sea on September 9 (evening).

Appendix.

Historical Sketch.—That part of northern Gaul corresponding to modern Belgium was occupied at the time of the Roman Conquest by a Germanic race who had previously expelled the Celts, while some of the latter, occupying the left flank of the Rhine and the Rhine island of Batavas, joined the Cimbri in 100 B.C. in their onslaught upon Rome. These Celts being further lessened in numbers by inundations, their poor homes were occupied by exiles from the Germanic tribe of Chatti inhabiting the Hercynian forest, who thenceforth styled themselves Batavians (bet-auw, good meadows). They were a warlike race, and took service as mercenaries with the Romans. The Batavian cavalry were the favourite troops of Cæsar, turning the tide of battle at Pharsalia, and down to the time of Vespasian the Batavian legion was the Imperial Body-guard. Their last achievement in Roman service was in the middle of the fourth century under the Emperor Julian, saving the day against a mass of United Germans—Franks and Alamanni—at Strasburg.

Their individuality afterwards disappears, the race merging in the Frank and Frisian tribes of their native soil. The flood of German and even Slav invasion set in a century later through the Netherlands, expanding into universal Empire—French dominion thus succeeding Roman, and German stock preponderating over Celtic. As a result, the "free Frisians," including the old Batavian element, nearest blood relations of the Anglo-Saxon race, by this time occupy the northern portions of the Netherlands, including the whole future European territory of the Dutch Republic.

For four hundred years (900-1300) Holland was ruled as a German fief by a succession of local counts, bearing the patronymic of Dirk (VII), Floris (V), William (II), up to John the Last, died 1299, after whom their rule passed, chiefly by intermarriage, successively to Hainault, Bavaria, Burgundy, Spain, and the Empire, the Hollanders yet retaining their principal towns, their civic rights and ancient privileges—the latter often encroached upon by

competing interests from external states, but never entirely lost, or if so again quickly recovered under more favourable circumstances.

At a later period, when the shock of the Reformation resulted in a general cleavage, we find the Hollanders separating from their natural allies and neighbours (Union of Utrecht, 1579),the Belgians, to enter on an independent career, throwing off the yoke of Spain after a devastating war lasting eighty years—1568-1648—developing thier navy, agricultural and municipal systems, taking an active part in the wars of the seventeenth century by sea and land against the French, English, and other neighbouring nations; foremost in the arts, especially painting, navigation and commerce, founding new colonies in both hemispheres, the wealth and luxuries of the East crowding into their ports, while their contemporaries as a rule lacked such enterprise. A glorious record this from a country with primarily few, if any, natural advantages except those accessible from the sea. The memory of the stadholders and rulers of the House of Orange was, it is true, temporarily obscured by the adventures of Napoleon a century ago, but the old thrift and energy remain in its new settled government, flourishing towns, and agricultural and engineering triumphs.

Friesland, in a remote corner of Holland, survives as an example of sturdy independence, untouched by the feudal system, and always successfully resisting oppression, from whatever quarter directed.

It is at this point that our own nation comes into direct touch with the inhabitants of Holland, both belonging to the low Germanic branch of the Aryan family. Doubtless elsewhere there is by this time much admixture, and it was noticed recently that, while most of the population are of our complexion and build, there is an admixture of a dark element traceable to some source—colonial, Semitic or both—even among the better classes.

Belgium also, after a long period of decay and dismemberment, maintains its newly gained independence and prosperity under a succession of rulers of the old faith.

Reviews.

THE MEDICAL ANNUAL: THIRTY-SECOND YEAR, 1914. Bristol: John Wright and Sons, Ltd. 1914. Pp. cxxxvi and 951. Price 8s. 6d. net.

The present is the thirty-second year of issue of *The Medical Annual*, an indispensable publication for all those who wish to keep themselves acquainted with recent advances in medical knowledge. The volume for this year has been increased in size by one hundred pages, but the Editor hopes this will not be a permanent increase in the bulk of the Annual. A detailed criticism of the contents of such an old-established favourite is unnecessary, especially as the issue under review more than maintains the high standard of its predecessors. Attention may, however, be drawn to one or two contributions. Among the articles on tropical medicine, for which Lieutenant-Colonel Leonard Rogers is responsible, is an important paper on pellagra, illustrated by coloured plates. This should prove of special interest at the present time, as it is now well recognized that cases of pellagra are to be found in England, especially among the asylum population. The article on amœbiasis is also well worthy of notice. In the section on X-ray diagnosis by Dr. Thurstan Holland there is a beautiful plate showing gall-stones in the gall-bladder, and some interesting new points in connexion with the diagnosis of this condition. Clinical pathology is dealt with by Dr. O. Grover who contributes a number of interesting articles. The volume is particularly well illustrated and should prove useful to all practitioners of medicine.

O. L. R.

HOW TO KEEP FIT. By W. McAdam Eccles, Sir Robert W. Barnet, Sir Dyce Duckworth, Sir R. Douglas Powell. London: Jarrold and Sons. 1914. Pp. viii and 131. Price 1s. net.

"How to Keep Fit" consists of a series of lectures by different authors on various subjects in relation to health.

Several of the chapters, e.g., those on "Alcohol," "The Value of Discipline," "A Sound Mind in a Sound Body," and "Chastity," will be found useful to medical officers seeking subject matter for lectures. To the non-commissioned officer in charge of recruits and boys its pages contain much which he can with advantage impart to his charges as occasion arises.

The author's views on clothing are peculiar, and not such as are generally accepted. His statement that deficiency of clothing is the cause of the higher death-rate amongst male, as compared with female children, can hardly be accepted off-hand. The article on "Braces" is interesting, and well worth consideration. On the whole, this little volume well repays the short time required to study its pages.

R. H. C.

TEXT-BOOK OF LOCAL ANÆSTHESIA. By Professor Dr. Georg Hirschel, Heidelberg. Translated by Ronald E. S. Krohn, M.D., London, with illustrations. London: John Bale, Sons, and Danielsson, Ltd. 1914. Pp. xii and 181. Price 8s. 6d. net.

In this work the author deals exhaustively with the subject of local anæsthesia.

The first part of the book is devoted to the history of local anæsthesia and the indications for it, and contains a description of the most suitable drugs and instruments to be employed. The second part of the book deals with the body regionally, namely, operations on the cranium, face, neck, thorax, abdomen, uro-genital tract, and rectum, the upper and lower limbs being considered *seriatim*. Special paragraphs are devoted to the employment of local anæsthesia in operations for inguinal hernia, femoral hernia, hydrocele, varicocele, and kidney affections. In each case the nerve distribution to the part is carefully described, illustrated by excellent photographs. The book should be of great assistance to surgeons, who, whilst realizing that the employment of local anæsthetics need no longer be restricted to minor surgical operations, wish for some handbook on the subject to guide them. To those surgeons who have frequently to work short-handed these methods should prove invaluable.

Some of the more complicated manœuvres described—for example, the perineural injection of the main branches of the trigeminal nerve and brachial plexus—will probably have to be left to those having special experience in the work; but the general surgeon should utilize the simpler infiltration and conduction methods for the performance of such operations as the radical cure of hernia, the excision of hæmorrhoids, and thyroid tumours.

Whilst considering the indications for the use of local anæsthetics, sight should not be lost of one point not brought out by the author. It is a question if patients would readily submit to extensive operations, such as the removal of the upper jaw, unless they were promised the oblivion afforded by a general anæsthetic. H. C. S.

DIE MODERNE THERAPIE DER GONORRHOE BEIM MANNE (*Ein Leitfäden für Studierende und Arzte*). By Professor Dr. Paul Asch. Bonn: A. Marcus u. E. Webers Verlag. Pp. 84. Price: Paper, M.2.60; bound, M.3.20.

This work, which consists of twelve lectures on the treatment of gonorrhœa, makes no attempt, as its author remarks in his preface, to discuss the subject of gonorrhœa in the text-book style. Its aim is to describe in an easy manner the methods of treatment which the author has found in fifteen years' special experience to be the most useful. In the first lecture the gonococcus and its various atypical forms are described, as well as the chief ways in which infection is brought about. The next four lectures deal with the treatment of acute gonorrhœa.

Discussing the question of irrigation in comparison with purely internal treatment, he has found that with the latter 30 to 40 per cent of patients develop complications and 70 per cent are uncured at the end of two months, while under the irrigation treatment only 7 per cent

develop posterior urethritis, none epididymitis, and 63 per cent are cured in four weeks, as tested by frequent microscopical examinations. These results are certainly striking and attributable to the care with which the irrigation is carried out and the general measures adopted. The author is not a believer in irrigation of the whole urethra until there is evidence of posterior urethritis. He lays great stress on the wearing of a good suspensory bandage from the commencement, since he believes that infection of the posterior urethra and epididymitis are encouraged by the pendulous position of the penis, the pus being dammed back behind the peno-scrotal angle. The suspensory bandage recommended is Bergmann's (made by S. G. Hoffmann, Berlin, C54), which supports the testicles comfortably and carries the penis on the abdomen. As routine, potassium permanganate in a strength of 1 in 4,000 is used during the first week, commencing when the very acute symptoms have abated. The strength of the solution is increased during the next two or three weeks to 1 in 1,000. During and after the third week the permanganate may be replaced with one of the silver salts well diluted, or this may be done earlier if the gonococci do not diminish sufficiently quickly. A syringe is not recommended unless the patient for some reason cannot attend for the irrigation treatment. The syringe should then be a small one and not more than 4 to 5 c.c. injected at a time during the acute stage, since it is easier with a syringe to force fluid into the posterior urethra. The technique of irrigation is carefully described, and the description contains many valuable hints. When irrigation is administered by the surgeon himself, the patient sitting on a bidet and the surgeon beside him, the surgeon should palpate constantly the urethra with his left middle finger so as to estimate to a nicety the pressure of fluid within the urethra, and the irrigator is placed no higher than a metre above the penis, a litre of solution being used. The passage of metal instruments and the use of bougies, including Gaviblen, are condemned.

With regard to internal remedies designed to render the urine antiseptic, these are considered valuable adjuvants to the treatment of posterior urethritis, and in later stages when instruments are being used.

For prostatitis, in addition to stopping all local treatment and the use of hot sitz baths, antipyrin and opium suppositories are used to allay the pain, and in the later stages ichthyol or thigenol to assist absorption. For epididymitis the injection of one to two centimetres of electrargol with a fine needle into the epididymis is mentioned with considerable enthusiasm. If carried out in the earliest stage only one injection is necessary to promote quick and complete recovery: commenced at later stages it may be necessary to give two or even three injections. With this treatment he has succeeded in restoring the passage in cases of double epididymitis, so that spermatozoa were subsequently found in the secretion expressed from the prostate.

One lecture is devoted to the administration of vaccines, in which the author has great faith, though he does not think they appreciably affect the condition of the urethral mucous membrane. The last four lectures deal with the treatment of chronic gonorrhœa and include the use of sounds, urethroscopy, dilators, and the commonest operations required in the treatment of chronic gonorrhœa. Altogether, eighty-one pages of sound, common-sense teaching which few will read without profit, and all with pleasure.

L. W. H.

A HISTORICAL ACCOUNT OF THE BERLIN ARMY MEDICAL SOCIETY (*Festschrift zur* 50 *Jährigen Stiftungsfeier der Berliner Militärärztlichen Gesellschaft am* 20 *Februar*, 1914). By Oberstabsarzt Professor Dr. Bischoff.

This volume, consisting of over seventy pages, has been published to celebrate the fiftieth anniversary of the Berlin Army Medical Society. It gives the details of the birth of the society and describes its growth, its aims, and objects.

A large part of the book is taken up with a list of the papers read at the monthly meetings of the society, and a complete alphabetical list of members also appears.

At the end of the book there are some brief notes on similar societies existing in the various army corps regions. I. V. F.

SCLERO-CORNEAL TREPHINING IN THE OPERATIVE TREATMENT OF GLAUCOMA. By R. H. Elliot, M.D. Lond., F.R.C.S.Eng., etc., Lieutenant-Colonel, I.M.S. Second Edition, revised and enlarged. London: George Pullman and Son, Ltd. 1913. Pp. xxvi and 187. Price 7s. 6d. net.

A second edition of this work has appeared within a year of the publication of the first edition; this is eloquent testimony of the great interest which the book has created amongst those interested in eye work.

In India, at the Government Ophthalmic Hospital, Madras, Colonel Elliot has had exceptional opportunities of investigating and operating upon cases of glaucoma. During the last four years he and his confrères have performed the operation of sclero-corneal trephining associated with his name in over 1,000 cases of glaucoma. Unfortunately in India it is difficult to keep cases under continuous observation and only twenty per cent of these cases could be followed up. Colonel Elliot's results, published in this work, are significant of the success of his operation; of 203 cases which were followed up in only 17 did the tension return to above normal, and in a very large majority the vision improved or remained the same as at the time of operation.

The technique of the operation is so lucidly described and the minute details of its performance are so clearly illustrated in this book that the veriest tyro should have no difficulty in performing the operation successfully. All the possible complications which may be encountered are clearly set forth with the appropriate treatment of each.

In chronic glaucoma, as a result of Colonel Elliot's writings, teaching, and practice, corneo-sclerol trephining is superseding the older sclerotomy operations of Lagrange and Herbert. Not many years ago, the broad iridectomy of von Graefe was the "one and only" approved operation for acute cases of glaucoma; iridectomy still holds pride of place, but in many parts of the world distinguished ophthalmic surgeons are relieving this condition more and more frequently by the sclero-corneal trephining of Colonel Elliot.

The sufferer from that dreaded disease, glaucoma, owes a deep debt of gratitude to Colonel Elliot. W. N.

Current Literature.

Antityphoid Inoculation with living sensitized Vaccine.—Ciuca, Combiescu, and Balteanu (*Comptes rend. Soc. de Biologie*, No. 16, May, 1914) report some results of antityphoid inoculations, both with sensitized vaccine and with vaccine prepared by killing the bacteria at 60° C. for one hour. Following an outbreak of typhoid fever in January, 1913, approximately half the men of the affected regiments were inoculated with a living sensitized vaccine, doses of one cubic centimetre and two cubic centimetres being given intramuscularly with an interval of eight days. The strength of the vaccine is not stated. By the end of May, 1913, 1,298 men had been inoculated. The local reaction after inoculation was moderate in degree and passed off within forty-eight hours. The temperature rose above 101·3° F. in 5 per cent, oscillated between normal and 101·3° F. in 15 per cent, and in 74 per cent of cases did not exceed 99·5° F. Stools of 44 inoculated men were examined and none were found to be carriers.

Five months later these regiments, on returning from Bulgaria, again suffered from an epidemic of typhoid fever. It was decided to inoculate the men who had been left as controls during the previous inoculations, and the greater number of these were vaccinated with typhoid bacilli *heated to* 60° *C.* Five months after these latter inoculations the incidence of typhoid fever was found to have been as follows: no cases amongst those inoculated with the sensitized vaccine, two cases amongst those inoculated with the heated vaccine, and eight cases amongst the comparatively small number who had received no inoculation.

C. J. C.

Researches on Sprue.—P. H. Bahr (*Trans. Soc. Trop. Med. and Hyg.*, April, 1914), describes the results of his studies of sprue in Ceylon. He finds that all races of natives are liable to the disease, but not to so great an extent as imported Europeans. He includes among his cases under the heading of "incomplete sprue" cases having the typical diarrhœa without the tongue symptoms, and "tongue sprue" cases without diarrhœa. In two autopsies described in detail he found the tongue coated with a film of thrush, and the œsophagus covered with a membrane composed almost entirely of yeast fungi, both these tissues being deeply infiltrated with yeast cells and mycelial threads. In smears from the liver from one post mortem a few yeast cells were seen, and in preparations of the intestinal mucus these cells and branching mycelium were the most abundant organisms found. Yeasts were grown in glucose broth from every part of the intestinal canal, also in one case from the liver and spleen, and from the kidneys in the other. The intestine from duodenum to rectum exhibited chronic inflammatory changes. The liver cells showed fatty degeneration, and in the spleen there were observed in the swollen endothelial cells of the venules certain hyaline bodies, non-acid-fast, Gram positive, and staining pink, violet, or blue with Giemsa, which the writer considers to be of a degenerative nature and due to an atrophic change consequent upon and peculiar to sprue.

The author is disposed to regard the disease as being caused by these fungi, and endeavoured to classify them by means of sugar reactions, but without success.

Feeding experiments with cultures produced no effects on monkeys, rabbits, or guinea-pigs. Intravenous injections with cultures produced uræmic symptoms in rabbits, and death in a few days, yeast cells and mycelial elements being found in necrotic foci in the kidneys. Other strains isolated from milk, air, amœbic dysentery, etc., were non-pathogenic. C. J. C.

Territorial Hospitals established in France in Time of War.—The following information regarding these hospitals has been extracted from the latest edition of an official handbook entitled *Ressources du Territoire national pour l'hospitalisation des malades et blessés de l'armée*, issued May 21, 1913.

The general scheme is indicated in the opening remarks, which read as follows: "Military and mixed hospitals already existing in the home territory being able to receive only a portion of the sick and wounded from an army in the field, it is essential that a large number of new hospitals, which will bear the generic name of *hôpitaux temporaires*, shall be organized at different points for the treatment of sick and wounded. The army medical service is charged with preparing in time of peace for establishing these hospitals; and it will be assisted in carrying out this task by military and civil authorities, whose co-operation may be necessary." These hospitals will be organized in fortresses (*hôpitaux temporaires de place forte*), in certain centres near the field army (*hôpitaux temporaires de couverture, de gare de première destination*), and in a large number of towns and areas in the home territory *hopitaux temporaires du territoire*). Special arrangements are made for equipping and manning the first two classes. The following remarks refer only to the third class, viz., the hospitals established in the home territory.

Classes of Hospital.

There are two kinds of territorial hospitals: (1) those equipped by the medical department and designated *hôpitaux complémentaires du territoire*, and (2) those equipped by voluntary aid societies and designated *hôpitaux auxiliares du territoire*. Arrangements for equipping these are made during peace. These two classes of hospital are equipped very much on the same lines, but the equipment and personnel are drawn from different sources. The various steps to be taken by the military authorities on the one hand and the voluntary aid societies on the other are specified in detail below.

Object.

Hôpitaux temporaires du territoire are established for the reception of (1) men falling ill during mobilization, and (2) sick and wounded evacuated from the field army.

Class of Building to be Selected.

The places selected for the establishment of these hospitals are: (1) Schools, colleges, boarding-houses, asylums, large hotels, all of which

already possess beds, bedding, kitchen-utensils, &c., and which can therefore be readily transformed into hospitals if their sanitary conditions admit of their being used for this purpose; (2) establishments or buildings of any description, which, from general arrangement, situation, and size could be utilized in an emergency.

These temporary hospitals are established as far as possible in localities served by a railway line; they should each contain at least twenty beds, and forty cubic metres of air-space should be allowed for each patient.

Selection and Inspection of Building.

Steps to be taken in the examination of buildings capable of being converted into territorial hospitals:—

(1) *Hôpitaux complémentaires* (Military).—The Ministry for War notifies each army corps region what its probable requirements will be and the principal medical officer, assisted by medical officers, makes the selections. The principal medical officer details a medical officer stationed near or in each town where the hospital is to be formed to make the necessary inquiries and at the same time informs the mayor and the commandant, if any, of the officer's name.

Duties of Inspecting Medical Officer.—(*a*) The medical officer receives from the mayor information as to the number, nature, and importance of likely buildings; (*b*) from the commandant a list of buildings already reserved for general military purposes; (*c*) from the principal medical officer a list of buildings allotted to voluntary aid societies.

He inspects the various buildings after arranging an hour with the proprietor or the tenant. If he is of opinion that any of those buildings reserved for general military purposes are particularly adapted for hospital purposes he furnishes a report through the usual channel. If this can be done without disturbing mobilization plans the general officer commanding may approve of the change being made. The inspection report includes a general sanitary report on the building and its surroundings. It should state what the building is used for, its situation, and its cubic capacity; also a statement regarding its annexes, water supply, conservancy, means of heating and lighting, and its holding capacity; an estimate of structural alterations which will be necessary (assistance from engineers); description of how rooms, etc., are to be allotted in the hospital when formed; an estimate of the value of material in the building suitable for hospital use.

Reports are forwarded to the Ministry of War by the principal medical officer of the army corps, who endorses them with his remarks.

(2) *Hôpitaux auxiliaires* (Voluntary Aid).—Voluntary aid societies select and examine buildings on the plan already described. A report on their selection is submitted to the principal medical officer of the army corps, who transmits it to the general officer commanding for approval. The application is accompanied by a statement giving the consent of the owner or tenant of the building. If military approval is given the building is examined by a medical officer detailed by the principal medical officer. A report is forwarded to the Ministry of War, on which it will be stated that the building complies with conditions required and that it is capable of holding the requisite number of patients.

Numbering of Hospitals in Army Corps Areas.

Applications for the allotment of buildings as military territorial hospitals in war are prepared in peace time, and each hospital in every army corps area is given a consecutive number starting from No. 1. There is no limit to these.

With regard to *hôpitaux auxiliaires* (Voluntary Aid) the Ministry of War gives the voluntary aid societies permission during peace time to make use of certain buildings as hospitals on mobilization. This concession is granted as a rule for one year to allow the society to get ready, i.e., collect material, etc. It may be granted for a second year, after which time the concession lapses unless the society has equipped itself sufficiently to be graded in the first or second category of auxiliary hospitals (i.e., ready to mobilize between the fifth and tenth day or between the eleventh and twentieth day). The regional delegate furnishes a report on the resources at his disposal and applies to the principal medical officer to be inspected. A report is forwarded to the Ministry of War by the principal medical officer, on which he states whether the auxiliary hospital is to be graded in the first or second category. The War Ministry then allots the hospital a number. In each army corps region the numbers run as follows:—

1 to 100 for the *Société de secours aux blesssés,*
101 to 200 for the *Union des Femmes de France,*
201 to 300 for the *Association des Dames françaises.*

No building belonging to private individuals is allotted to voluntary aid societies without the approval in writing of the proprietors. The Minister of War does not allot any Government building to the army medical service or to the voluntary aid societies without first consulting the departments using the buildings. When they have been allotted, he notifies the departments concerned of the date after mobilization on which the buildings are to be handed over to the medical authorities. In the same way in army corps regions the principal medical officer notifies the civil authorities which buildings will be used as hospitals, and he also notifies the owners of the buildings. When auxiliary hospitals are to be established in private houses the regional delegate notifies the proprietors.

Organization.

Organisation of hôpitaux temporaires du territoire (General).—The allotment of a building as a war hospital being approved by the Ministry of War, the local voluntary aid committee, in the case of auxiliary hospitals, proceed with the organization on the following lines. They determine: (*a*) How much material and what drugs, etc., can be obtained locally and at what price; (*b*) what arrangements should be made for washing and disinfection of linen and clothing; (*c*) to what extent the resources of the town can be relied on to provide food and fuel; and (*d*) what arrangements have to be made for the transport of sick and wounded from the railway station to the hospital.

In each case the cost must be worked out.

An appendix to the official handbook gives the detail of all articles required to equip these hospitals, quantities varying with the number of beds. (Number of beds may be from fifty to five hundred.)

Mobilization.—Orders and tables for both military and auxiliary territorial hospitals are prepared in duplicate, one copy being kept by the medical officer who will be in charge of the hospital or by the president of the local society, and the other copy is filed in the office of the principal medical officer of the army corps. These must be kept up to date and amendments forwarded to the principal medical officer when they are made.

Grouping of Hospitals.—Smaller hospitals, that is with less than one hundred beds, may be attached in the same town to larger hospitals, which are better and more fully equipped and which are designated central hospitals. If there is a military hospital in the town it should always be made the central hospital.

PERSONNEL.

Establishments are fixed according to the number of beds in the hospital.

(1) *Hôpitaux complémentaires* (Army).—(*a*) Medical officers, pharmacists, and quartermasters of over twenty-five years' service or belonging to the reserve. Doctors belonging to the reserve of the territorial army. The senior medical officer always belongs to the territorial army. Each hospital should, if possible, have one surgeon. Medical officers of the territorial army doing duty with troops may also do duty in hospital. Civil doctors having no military obligations may also be requisitioned if the number of medical men is not sufficient. (*b*) Medical orderlies (*infirmiers*) are drawn from the territorial section of *infirmiers militaires*, or if the numbers are insufficient they may be taken from the departmental service (*service auxiliaire*), or from the reserve of the territorial army. But the latter should be attached by preference to military hospitals for which the date of mobilization is not fixed in peace time.

The total establishment of any hospital must not be made up of men from the *service auxiliaire* or the territorial reserve. Some men of the *sections territoriales d'infirmiers militaires* must be allotted to each hospital to perform duties requiring more advanced knowledge.

Medical officers, etc., under (*a*) are appointed to the various hospitals and receive their mobilization orders from the principal medical officer of the army corps area. Other ranks receive their orders through the general officer commanding the army corps (on the recommendation of the principal medical officer), who notifies the various recruiting offices on what day of mobilization they are to assemble.

Dates and places of assembly on mobilization.—Senior medical officers and quartermasters are summoned to headquarters of the army corps and receive verbal instructions from the principal medical officer. They then proceed to their various hospitals, arriving if possible the day before the work of turning the building into a hospital commences, if possible six days before the hospital is due to open. Other medical officers should arrive four days before the hospital opens. If, however, the work of alterations is to be performed by the hospital orderlies, they must assemble at the same time as the senior medical officer. Men belonging to the *sections territoriales d'infirmiers* proceed first to the depot of *sections d'infirmiers* to draw their equipment. If the hospital to which they have been allotted mobilizes early they proceed there direct and steps are taken to equip them subsequently. Senior medical

officers report to the recruiting offices the number of men who fail to report themselves and apply to have them replaced.

(2) *Hôpitaux auxiliaires du territoire* (Voluntary Aid).—The personnel for these hospitals is recruited by the voluntary aid societies. The senior medical officer and medical staff are selected from doctors of medicine. The duties of assistant surgeons (*aides-médecins*) are performed by medical students with a certain amount of training. In default of medical students civil practitioners may be employed. They are called "*médecins-adjoints*." Their appointment as well as that of medical students must be approved by the Ministry of War.

Nominal rolls are prepared by the regional delegate and sent to the regional principal medical officer for transmission to the War Ministry.

The personnel of voluntary aid hospitals must be free from all military obligation to serve. There are certain exceptions for doctors, students, and orderlies in excess of military requirements; but these must all be posted to auxiliary hospitals of the first or second category. Application for these particular men to serve with the auxiliary hospitals must be made on a special form by the regional delegate and forwarded to the principal medical officer for the approval of the general officer commanding.

Mobilization of military personnel.—Mobilization orders are approved by the general officer commanding, and are issued by the officer commanding the recruiting bureau to each man. The order states to what voluntary aid society the man is attached, and what hospital he is to join and the date of joining. Other persons allotted to auxiliary hospitals who have no military obligations receive their instructions for war in peace time from the president of the local committee. These are in writing and are signed by the local president and the regional delegate.

Date of joining of personnel.—The personnel of auxiliary hospitals of the first and second catagories must assemble at the hospital four days before it is due to open. The senior medical officer and his quartermaster must arrive the day before the work of equipping the hospital begins. The personnel of the third category await mobilization orders in their homes.

Declaration of willingness to serve.—Each member (male or female) of the various voluntary aid societies must sign a declaration of willingness to serve in the hospital. These declarations are countersigned by the president of the local committee and the regional delegate and are filed in the mobilization journal. Any person desiring to withdraw can do so by tendering resignation in writing.

Equipment of Hospitals.

(1) *Hôpitaux complémentaires* (Military).—The material is obtained from local, regional, or national resources. Senior medical officers when drawing up schemes must first make certain that local and other resources have not been requisitioned for other services.

Local resources include: (*a*) furniture, bedding, linen, kitchen utensils, etc., which are already in the buildings to be used as hospitals which may be given by the owners or lent while the war lasts. (*b*) Equipment obtainable on mobilization by arrangement in peace time by purchase, loan, or presentation.

Regional resources are resorted to when local supplies are insufficient. A note is kept of what is required and where it is to come from on mobilization.

National resources include government stores in the army corps region which are in excess of requirements of the area, and stores which can be issued from the medical supply depots. The Minister of War controls the issue of these.

Special arrangements for storing equipment, etc., will be made if local resources are not sufficient to enable the hospital to open during the first ten days of mobilization, and where local, regional, and national resources will not suffice for a hospital to open complete for duty after the tenth day of mobilization.

Investigation with regard to food supplies must be made during peace and the results or findings must be recorded in the mobilization journal of each hospital.

Contracts and arrangements for purchase of drugs, clothing, for washing, disinfection, etc., must be made for each hospital in peace time.

Transport of sick and wounded and of material.—A scheme for transport between the station and hospital must be worked out in peace time. Provisional purchase may be arranged. Hiring and requisitioning may be resorted to in emergencies.

Brassards for the personnel.—The regional principal medical officer indents on the War Ministry in peace time for brassards for each hospital.

Requisition and receipt vouchers.—A book of these is issued to each senior medical officer on mobilization by the principal medical officer of the army corps, who receives them from the general officer commanding. Entries to be made in mobilization journal for each hospital: (1) What articles are to be collected. (2) How and from whence they are to be got. (3) How locally acquired articles are to be used, and what the rationing arrangements are to be. (4) If applicable, how locally stored equipment, etc., for use in other hospitals is to be despatched.

A list of contracts or arrangements for purchase is to be attached to the mobilization journal which is kept by the principal medical officer; the senior medical officer of the hospital keeps the other copy.

(2) *Hôpitaux auxiliaires* (Voluntary Aid).—According to their state of preparedness they are classified in three categories. First category: Those that have completed their arrangements and which can open for the reception of patients between the fifth and tenth day of mobilization. Second category: Those that are sufficiently prepared to be able to open between the eleventh and twentieth day of mobilization. Third category: Those in process of being organized and which have had buildings allotted to them provisionally.

Only the first two categories have numbers allotted to them.

Obligations required of auxiliary hospitals of the first and second categories.—The necessary equipment must be found by the voluntary aid societies. Surgical instruments, dressing materials, fracture apparatus, special articles for the use of sick, stretchers, brassards, regulations, documents, etc., must all be provided in peace time. Surgical instruments and splints will be considered as supplied if doctors who are to be attached to the hospitals certify in writing that they have them in their possession and that they will be available for use in the hospital on mobilization. Bedding, clothing, linen, table appointments, etc., must be acquired in

peace time, either actually or by promise in writing from those who possess them. Medicines, dispensary equipment, and india-rubber goods need not be purchased till mobilization takes place, but arrangements must be made in time of peace with local chemists to supply them when required. The conditions of purchase must state the approximate price of these supplies sufficient for two months and the society must put a corresponding sum aside for this purpose. Kitchen utensils, expendable articles, laundry equipment, furniture, heating and lighting apparatus need not be got before mobilization. No laundry equipment will be necessary if a local contract for washing can be made.

Reserve funds.—The society must lay aside a certain sum of money for each hospital: (1) To defray the expenses of making alterations to the building to make it suitable for a hospital. (2) To buy the articles for which conditional purchase has been arranged. (3) To cover the expenses of running the hospital, to be calculated on the basis of 2 francs per bed per diem. This amount includes the pay of the subordinate personnel.

Auxiliary hospitals which have got the whole of their equipment, personnel, and the necessary funds to run their hospital for two months are grouped in the first category; those which have at least half the above are graded in the second.

Brassards and Identity Cards.

Neutrality brassards and identity cards for the personnel of auxiliary hospitals are provided in peace time by the voluntary aid societies. They must bear: (1) the stamp of the Minister of War, (2) a special letter for each society, namely, S for *Société francaise de secours aux blessés*, F for *Union des Femmes de France*, D for *Association des Dames Francaises*.

The brassards are issued on repayment to the societies stamped as above described.

In the area of each army corps requisitions for brassards are made out in triplicate by the regional delegates who send them to the director of medical services for transmission to the Minister of War. The identity cards, the form of which must be approved by the Minister of War, are prepared by the voluntary aid societies and are signed by the regional delegate and the principal medical officer of the army corps. These brassards and cards are kept in peace time by the president of the local committee, and are distributed to the personnel the day before the hospital opens.

Distinctive badges.—All members of the various societies wear their distinctive society badge. These must be provided in peace time.

Transport of sick and wounded.—A scheme for conveying patients to and from the station must be drawn up in peace time.

Mobilization journal.—All contracts with tradesmen and members of the society are filed and kept by the president of the local committee. A certified copy is sent to the principal medical officer. The president's copy is examined every year on June 1 by the principal medical officer, together with an annual statement on personnel, equipment, and funds available.

Change in classification.—A hospital which increases its beds, personnel, funds, etc., may be promoted to the higher category on application being made to the principal medical officer and after approval by

the Minister of War. A local committee which has undertaken the equipment of an auxiliary hospital will not be given permission to start another one, unless their first one has been ranked in the first category.

Number of Hospitals.

Number of Hospitals and Date of Opening.—The number of temporary hospitals to be opened in each army corps area on mobilization is fixed during peace by the principal medical officer under instructions from the Ministry of War. The percentage of sick to be provided for in each centre of mobilization is fixed in peace time, and also the approximate number of wounded which will be evacuated into each army corps area. The date of opening of each hospital is determined by the general officer commanding the army corps during peace. They will be opened as required, starting from the fifth day of mobilization.

Auxiliary hospitals of the first category open first, then the second category.

Hôpitaux complémentaires (military) will be opened in sufficient numbers to accommodate men falling ill during mobilization, and eventually for the reception of sick and wounded evacuated from the field armies. All these hospitals must be in working order on the thirtieth day of mobilization at the latest.

In fixing the dates on which hospitals will open the principal medical officer will be guided by the length of time calculated as necessary to carry out structural alterations, and by the date on which the building becomes available. (It might be required for some days for troops mobilizing.)

Additional Hospitals.

In addition to the above resources arrangements are made during peace for a certain number of *hôpitaux complémentaires* (one-tenth above estimated requirements). The date on which they open is not fixed; they are opened when required, the principle on which they work is that they open when about eight-tenths of the hospital accommodation in the army corps area has been taken up. The auxiliary hospitals of the third category are opened first; the regional delegates report on their state of preparedness to the principal medical officer. The principal medical officer reports to the War Ministry when any new hospital is opened.

Annual Reports.

Each principal medical officer of an army corps keeps a general register of hospitals available for the accommodation of sick and wounded in war. This is kept up to date as far as the auxiliary hospitals are concerned by means of reports furnished by the regional delegates of voluntary aid on June 1 describing the available resources in personnel, material, and funds of the voluntary aid societies. From these reports he compiles a return of the available resources in his area for the information of the Ministry of War.

Mobilization.

Steps to be taken on Mobilization.—On the first day of mobilization the principal medical officer of the army corps despatches notices already prepared during peace to the following: (1) To mayors of towns where

hospitals are to be opened. (2) To owners or managers of buildings which are to be used as hospitals. (3) To the various tradesmen, contractors and others who have agreed to provide material, etc. (4) To the delegates of voluntary aid societies accredited to his area.

The civil authorities or proprietors are responsible that the buildings allotted as hospitals are at the disposal of the military authorities or voluntary aid societies on the date arranged beforehand. Where schools are to be used all pupils are sent home. Teachers and employers having quarters in such buildings are to be allowed to remain there if they wish to do so; but part of their accommodation may be requisitioned if the hospital gets very full.

The principal medical officer receives the various senior medical officers of hospitals and their quartermasters. He issues to each senior medical officer a book of requisition and receipt forms. He informs him if need be whether to apply to the commandant or the mayor of the town for the mobilization journal. He informs the quartermaster how and when he will receive his imprest account for running the hospital. The first advance is based on the following scale: 15 francs per bed for military hospitals with less than 100 beds; 12 francs per bed for military hospitals with from 100 to 250 beds; 10 francs per bed for military hospitals with more than 230 beds. These money orders are prepared in peace time. The principal medical officer will see that the various military hospitals get ready according to the mobilization tables in his office. He will send to the senior medical officer of each fortified place the mobilization instructions for voluntary aid hospitals to be opened there.

Additional military territorial hospitals may be mobilized in the same way during the progress of the war.

Steps to be taken on opening a Territorial Hospital.—(1) *Hôpitaux complémentaires* (Military): (*a*) Inventory.—The quartermaster will at once proceed to take an inventory of the building and its contents. This is done in the presence of the owner if a private building, or of a representative of the mayor or government if a civil or military building. The inventory is made out in triplicate.

(*b*) Structural alterations are carried out at the expense of the Army Medical Department by a contractor engaged during peace. If the necessary alterations can be carried out by the personnel of the hospital a contractor need not be employed.

(*c*) Purchases and requisitions are made according to regulations laid down. Articles requisitioned for the duration of the war, such as furniture, etc., are to be valued when taken over, the value to be entered on the receipts given.

(*d*) Mobilization orders.—The senior medical officer will proceed with the work of getting ready according to instructions contained in his mobilization journal. The hospital must be ready to open on the date fixed.

(*e*) Surplus local resources.—Such articles locally in excess of requirements, and which have been allotted to hospitals in other towns, will be despatched by the senior medical officer according to instructions contained in his mobilization orders.

(2) *Hôpitaux auxiliaires* (Voluntary Aid): (*a*) Inventory.—This is taken by the person officiating as quartermaster along with a representative of whatever body the building belongs to. It is rendered in

triplicate. If the building belongs to a private individual a valuation of everything should be made at the time of taking over.

(*b*) Structural alterations are carried out at the expense of the voluntary aid society concerned by contract entered into in peace time.

(*c*) Purchases and Requisitions.—The voluntary aid society furnishes the hospital with the equipment which it has provided or arranged for in peace time. In emergency they will be allowed to requisition for articles through the principal medical officer on condition of subsequent repayment.

(*d*) Mobilization orders which are drawn up in peace time must be strictly complied with.

Administration of Territorial Hospitals. Admissions of sick and wounded.—The senior medical officer receives due notice of the arrival of sick and wounded by train. He must make the necessary arrangements for meeting them and conveying them to hospital.

Administration.—The regulations governing duties in army hospitals will be complied with.

Money advances.—These may be made by the principal medical officer to military hospitals when the first money advance has been exhausted.

Voluntary aid societies are entitled to 1 franc per diem per patient treated in hospital. This amount will be paid monthly in arrears if required.

Replenishing of material, etc., will be carried out locally as far as possible. Requisitions may be sent to the Ministry of War through the principal medical officer if local and regional resources become exhausted.

Voluntary aid hospitals may, if necessity arises, be allowed to purchase Government stores at Government rates.

Pay, board, clothing, etc., of personnel.—The personnel (doctors and orderlies) are accommodated on the premises or boarded out in barracks or in the town. The orderlies wear no uniform or Government equipment. They are provided with the neutrality brassard. They may be given a clothing allowance. The issue of pay to medical officers and men employed by the army is governed by regulation. Military orderlies employed in voluntary aid hospitals are fed, clothed and paid by the voluntary aid societies. For discipline they are under the commandant of the station.

The Closing of Territorial Hospitals.—The Minister of War orders hospitals to be closed through the principal medical officers of army corps. The senior medical officer must notify the owners of the building and the various contractors employed. The regional delegate informs the president of the local committee concerned. The quartermaster hands the building back to the owner or representative of the department that it belongs to, and damages are assessed. A report is furnished on damages and losses through the usual channel, and payment is eventually made by the Government.

Voluntary aid hospitals in handing over to the proprietors come to friendly terms as far as possible.

Buildings used as hospitals must be cleaned and disinfected before being handed back. The Government defray the cost of disinfection, etc., of military hospitals. Voluntary aid societies defray those expenses out of their own funds. If they have occupied a Government building the

disinfection, etc., must be carried out under the orders of the principal medical officer.

On the hospital closing the military personnel return to their homes, but those belonging to the *sections territoriales d'infirmiers* are sent to the depots. J. V. F.

Soldiers of 20 Years of Age.—Méd-Major Boigey contributed an article entitled "Les soldats de 20 ans" to the *Revue militaire générale* in November, 1913, in which he justified the lowering of the age at which recruits joined. The article is reviewed in the *Archives de Médecine et de Pharmacie militaires* for June, 1914.

If you must wait till the recruit is fully developed then you must wait till he is 25 years old. This cannot be done, and the line on which action must be taken is to have an army on the same footing as your possible enemies. When the three years' service has been properly established only one-third of the French army will be 20 years of age. In Germany forty-three per cent are of this age. When the new German law is fully established there will be 390,000 soldiers 20 years old and 450,000 in their 21st and 22nd years, against 200,000 French soldiers of 20 years, 210,000 of 21 years, and 220,000 of 22 years. Although the French army will be numerically inferior it will have a smaller percentage of young soldiers.

It has been said that the Germans pick their recruits more carefully, as they only take 27 per cent of the contingents called up, against 45 to 65 taken in France. While in France physical disability is the only cause for exemption from service, 45 per cent of German conscripts are excused for reasons of family, study, professions, travelling, etc.

After studying the health statistics of various armies the writer came to the conclusion that it is not always the young soldiers who supply proportionately the largest number of sick in hospital, invalids, or deaths. It is not justifiable to attribute systematically the bad health of an army to the youth of its soldiers; this is only one of the small contributing factors as compared with other hygienic conditions, to wit, training, accommodation, clothing, bedding, and feeding.

The conclusions to be drawn from the article are that, given a practical and judicious application of the laws of hygiene, no harm will result to the army or to the race by lowering the age of conscripts to 20 years.

J. V. F.

Some Medical Lessons from the Balkan Wars (*Der Sanitätsdienst im Balkankriege*).—Oberstabsarzt Dr. Joseph Hamburger recently gave a lecture at a military meeting at Lemberg on the Balkan War, which has been reproduced in the *Militärarzt* for April 25, 1914.

He briefly reviewed the medical organization, actual medical means, surgical aspect of wounds, and outbreaks of infectious diseases as they obtained or occurred in the various Balkan States, and after enlarging on some of the then existing deficiencies with which we are all now so familiar, he proceeded to formulate the lessons that were to be deduced from the war from the Austrian medical point of view.

One must consider an increase in medical personnel and make preparations for sufficient means of transport. If one accepts modern battle

losses at 10 per cent of the total strength of the army, 5 per cent of this total strength should be medical men.

As one-third of the wounded have to be carried, one should have 4 per cent of stretchers and 4 per cent of stretcher-bearers to the force, allowing that half of the severely wounded with their stretchers will be carried on vehicles of sorts. A large number of motor ambulance wagons should be provided. Motor ambulance wagon columns should be organized which could also travel over ploughed land. The wheels would have to be fitted with removable bands with some sort of spikes which would be taken off on getting on to a road.

Preparations for medical assistance in the first line are of great importance, as in modern battles one will usually have to deal with 20,000 to 30,000 wounded, and their rapid removal and evacuation is essential.

The Austrian Red Cross Society is now organizing a number of medical units to take over the wounded from the field hospitals and to look after them until their evacuation can be effected. These Red Cross units will consist of two medical men, four to six male orderlies, six professional female nurses and twenty-four volunteer female nurses (*Hilfskrankenpflegerinnen*). The equipment can be drawn from the mobile depots of the society.

An increase of army medical units in the field cannot be entertained, as the length of the train would be increased.

There is immediate accommodation for 10 per cent of the wounded in the field medical units, e.g., an army corps about 60,000 strong has nine field hospitals and three mobile reserve hospitals with an additional 300 beds, altogether 4,500 beds. In addition there are three local hospitals (*Feldmarodenhäuser*) with 500 = 1,500. Two rest stations (*Krankenhaltstationen*) each of 200 beds = 400. Grand total = 6,400 beds. Therefore altogether there is rather over 10 per cent accommodation immediately available; this does not include the divisional medical units which must be prepared to follow the army.

In most of the larger States the provision for accommodation of wounded behind the field hospitals is very considerable; for instance, in Austria the Red Cross Society has provided for the accommodation of 4,736 officers and 23,561 men, and in Hungary there are arrangements for the private accommodation of 38,000 wounded.

The lecturer drew another lesson from the war. He considered that in Austria a large number of trained professional nurses should be organized. They would be employed as nurses in hospitals in peace time and be embodied as professional nurses in voluntary aid columns in war. He was rather of opinion that ladies of social standing would be unfit for a large part of the heavy work of nursing, but that they could be usefully employed in operating theatres, in dressing-rooms, rest and refreshment stations, and on other duties of a light nature. J. V. F.

Changes in the German Army Medical Service in 1913.—The following notes have been taken from an article entitled "Fortschritte der fremden Armeen 1913," A. Deutschland, which appears in *Streffleurs Militärische Zeitschrift* for March, 1914.

The increase in the strength of the German Army has necessitated an addition to the establishment of medical officers. New hospitals are

being built at Wiesbaden, Koblenz, and Schrimm; the largest at Koblenz is to have 200 beds. The cost of construction works out at 6,090 marks (£304) per bed. One of the features will be the system of heating the floors of the wards

In various hospitals accommodation is now provided for the treatment of families of under-officers. At Holsa in the Losse Valley a new convalescent home for the 10th and 11th Army Corps has been opened.

An increased number of ambulance wagons for conveying sick from barracks to hospital has been provided; they are mostly converted wagons which have been eliminated from field medical units. There are still comparatively few motor ambulance wagons in use.

Comparatively few changes have been made in army medical equipment. Old medicines have been replaced by new, and some improvements have been made in the packing of the equipment. Some changes have been made in the case of instruments carried by surgeons in the field.

A preliminary sum of 204,600 marks (£10,230) was allotted in 1913 to provide portable water sterilizers for the *Etappensanitätsdepot* (advanced depôt of medical stores). The water in the approved apparatus is first filtered through pumice stone, then boiled, cooled, and freed from the taste of boiled water.

Great progress has been made in voluntary aid. In addition to the Red Cross Society, there are many women's societies (*Vaterländische Frauenvereine*) which occupy themselves with voluntary nursing during peace. There are over 1,500 such societies (*Vereine*) with about 480,000 members.

J. V. F.

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SOME ESSENTIAL FACTORS IN THE CONSTRUCTION OF FIELD SERVICE AND EXPEDITIONARY RATIONS.

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Royal Army Medical Corps.

IN the formulation of a ration for an expeditionary force one is faced by a formidable array of factors which demand consideration—some common to the formulation of all dietaries, some peculiar to the special conditions which must be met. It is with certain aspects of the latter—some of which present complex difficulties—that this article is concerned; the former call for no comment here, save that it is instructive to review certain differences between the factors which govern respectively the construction of rations for expeditionary purposes and dietaries suitable in civil life.

Civil dietaries—even for use in jails—present comparatively few problems. The demands of labour are mostly moderate and uniform, conditions of life are equable, the choice of articles of diet is wide, there is available an ample variety of fresh foods to suit all individual tastes and needs, and the food supply is organized and maintained by private competitive enterprise.

For an expeditionary force, when once it has left its base, each of these factors is radically changed. Work, arduous at all times, becomes exhaustive under the stress of exposure, mental tension and loss of sleep, the full force of adverse climatic conditions

must be met by the unaided resistance of the individual, infective disease dogs each step of the debilitated, rigidly inelastic conditions limit both the choice and amount of the diet available, and the peculiar communistic needs make no concession to idiosyncrasy.

Great as the sum total of these difficulties is when the force is in touch with its base, it is enhanced when the individual is detached and wholly dependent upon such food as he has himself carried in anticipation of this emergency—an emergency which must be provided against from the moment when he first takes the field. These are some of the difficulties, inherent in the problem, which can only be fully realized by those who have been called upon to provide their solution.

With this brief comment on the general bearings of the problem, we may pass on to consider the construction of rations—for (*a*) a military force in the field, and (*b*) for parties engaged in Polar exploration. Repetition will be obviated by dealing at the outset with certain points common to both.

Special Factors bearing upon Expeditionary Rations in General.

The generally accepted present-day view is that a diet providing 3,000 calories of potential energy is ample for men doing moderate work, but not adequate for the demands made upon men in the majority of campaigns and expeditions.

During a recent experimental march under active service conditions[1], the total work—internal and external—represented 4,033 calories per man per diem, and this, high as it appears, is still less than the average energy expenditure of actual campaign service. A ration supplying from 4,500 to 5,000 calories would not be excessive from either the practical or theoretical point of view. In order that health and efficiency may be maintained at the necessary high level, the body must receive adequate nutriment for both energy production and tissue repair, for, as an ancient Chinese proverb puts it, "If you put the pot on the fire with nothing in it the pot will burn." From the law of the conservation of energy it is obvious that the energy expended in the form of muscular work must be balanced by the potential energy provided in the form of food, and the amount of food required must therefore vary directly as the amount of work that the individual has to perform. It is,

[1] *Vide* Journal of the Royal Army Medical Corps, vol. xvii, p. 289 *et seq.*, 1911.

however, not sufficient to aim merely at establishing a calorie balance; while this is obviously essential, other factors which may be less obvious are of at least equal importance and call imperatively for recognition. The extent of the recognition which can be given is limited by the conditions under which any expeditionary force must work, and this leads to an enumeration of the principal essentials requisite for all expeditionary rations.

(*a*) *Provision of an Adequate Calorie Value.*—This must, as shown above, depend upon the amount of work demanded.

(*b*) *Provision of a Diet in which the Proportions of Proximate Principles and Essential Ingredients are suitably maintained.*—The relative proportions of protein, fat, carbo-hydrate and mineral matters which are desirable are either familiar or may be studied in any text-book on metabolism, but it must be remembered that it is not enough to observe the rules of fixed proportions, the palatability, digestibility and assimilability of such constituents must be considered. Further, the advance of knowledge leads to the addition from time to time of other ingredients of food to the list of the essentials which have to be provided—as, e.g., the vitamines, which are at present the subject of much research work which may profoundly modify our views on many important points. This question will be referred to again when we consider Polar rations (*vide infra*) with special reference to the provision of vegetables. Without going into detail, there is one general principle which may with advantage be emphasized here—it is that the increase of calorie value necessitated by excess of muscular work can best be provided by the addition of sugar to the ration. It is a matter of common knowledge that there is a craving for sugar among children, athletes, and soldiers on active service, and that the craving is due to the fact that nitrogenous food is utilized to better advantage in the presence of a high ratio of sugar. The present ration biscuit contains five per cent of sugar. Jam contains about fifty per cent, and sugar may be given in the form of chocolate, but this is too concentrated a food and induces thirst. In either of these forms sugar is of special value as a muscular food and is hence of great assistance to men undergoing hard physical work.

(*c*) *Portability.*—This is, above all others, the factor which is the most inelastic; we are rigidly limited to a certain weight which is fixed by the carrying capacity of the transport vehicle or the individual. We are thus restricted to a choice of such articles as give the maximum nutritive value in a minimal bulk. This object can only be achieved by concentration, that is, by the abstraction

of water; but even in our efforts to secure that concentration, we are checked by the fact that constipation results from too great a diminution in the bulk of food provided, while high degrees of desiccation involve loss of certain volatile matters upon which the palatability—and hence the digestibility—of many articles depends. In order to secure thorough mastication, easy deglutition and good digestion, I consider that no food intended to be eaten in the dry state should be concentrated beyond a point at which the residual moisture stands at six per cent. The Army biscuit, with its eight to ten per cent. of water, is well above this minimum.

In addition to the saving thus effected in the weight of water carried, it is desirable that economy should be effected in the weight of the material in which the concentrated diet is carried. Approximately two-thirds of the weight of tin plate cans might be saved by substitution of aluminium; other substitutes for tin are pegamyn, keratin, and waxed paper, all of which serve the purpose of preventing decomposition by excluding moisture.

(*d*) *Procurability.*—The importance of this factor depends upon the size of the expedition, the time available for preparation, the duration of the expedition, and the possibilities of replenishing its supplies. For military purposes it is important that a choice should be made of such articles as will be available at short notice and in adequate amounts. In this aspect of the problem is also involved that of expense, for the adoption of articles not in common use would add enormously to the cost of the periodical turn-over, which is necessary to maintain the reserves kept in peace time fresh and in good condition. This leads to the remark that in our field service ration probably the inclusion of bacon is, on these grounds, the only weak point, in that it is doubtful if the bacon in the country at any given time would suffice for the needs of a large force, and our supplies from abroad might not be maintained. This might be met by the institution of Government factories, which would not only take advantage of favourable markets for the creation of an ample reserve, but would further be able to check the inflation of prices by civilian contractors which otherwise would follow the outbreak of hostilities.

For the foregoing reasons it would be obviously undesirable to incorporate patented foods in rations designed for military purposes.

(*e*) *Preservation.*—The ration must be so preserved that it will keep wholesome for a period which affords an ample margin beyond the time of preliminary storage and that of the probable duration of the expedition. It may be accepted that modern methods of

sterilization and packing make the addition of preservatives unnecessary, and they should never be permitted. On the other hand, it must be recognized that the prolonged heat to which foods have been subjected in commercial processes of sterilization are liable to destroy certain essential constituents, and it is therefore necessary that control should be exercised over those processes.

When once sterility--absolute or relative—has been secured, access of air and moisture must be prevented in the case of all foods liable to undergo decomposition, and especially the nitrogenous articles. The selection of the enclosing material has been referred to, but as tinplate is still in general use, certain points regarding it may be noted. If inferior quality of tin-plate be used, it is liable to rapid erosion, especially in the presence of acid contents. Meat and vegetable rations packed in tin-plate of good quality may safely be kept tinned for at least a year, but that period should not be exceeded in the tropics. It may be laid down in general that food containing more than 300 milligrammes of tin per kilogramme is unfit for consumption.

It is important to remember that preparations suitable for use in cold or temperate climates may be unsuitable for expeditions working in the humid heat of the tropics.

It may be added that, contrary to popular belief, bacon does not keep well for long periods, and unless it is tinned, rapidly deteriorates in moderately warm climates.

(*f*) *Variety.*—In this respect not only have we to consider the range of articles needed to supply in proper proportion all essential food principles, but also the maintenance of appetite by the avoidance of a monotonous dietary. In this connection it is significant that articles providing the basis of a normal dietary do not tend to become monotonous; whereas men rapidly tire of such accessories as provide for exceptional and temporary needs. Bread and fresh meat can be eaten for long periods with zest—the British soldier has elected to have beef every day in the year and delete mutton wholly from his dietary—while distaste rapidly follows the continued use of sugar, which provides for unusual muscular exertion, or of highly seasoned foods, which provide so valuable a stimulus to digestion for men in conditions of exhaustion. It is therefore necessary to avoid monotony in the ration with regard to articles which fall into the latter class. Where there is a possibility of utilizing for this purpose the natural produce of the country, every opportunity of doing so should be taken; but in the cases where this is impossible, the system of alternative rations should be adopted.

(*g*) *Conformity to Habit.*—It is desirable that the expeditionary ration should conform as far as possible to the normal dietary of the men, and that an abrupt transition to unaccustomed articles of food should be thus avoided.

(*h*) *Applicability of Diet to Climatic Conditions.*—It is obvious that a diet suitable for a Polar expedition, with its enormous demands upon the heat-producing powers, and hence its need for an excess of fats, would be most unsuitable for a campaign in a climate where the demands call for an excess of muscular work with the minimum evolution of internal heat. In the case of the striking force which might at any minute be called to operate in climates with as wide a range as that of the Empire, it is necessary that a mean should be struck which would serve as a basis in either case.

(*i*) *Ease of Preparation.*—Under conditions in which every man must serve as his own chef, it is a matter of moment that the ration should be such as lends itself to rapid and simple preparation. This aspect has been simplified by the introduction of travelling field kitchens, the use of which should ensure that men have not to go on duty without their rations having been cooked.

(*j*) *Facility for Rapid Issue.*—The rations should be so divided into appropriate portions and so packed that issue of the correct amounts can be effected easily and rapidly. This obviates wastage and does away with the long wait which is so distressing to bodies of men at the end of the day's work when the main meal is urgently needed.

(*k*) *Cost.*—The question of relative expense is one which affects, or may dominate, the choice of the several items for an expeditionary ration. This factor may be summarized as that of the provision of the greatest possible energy value at the least possible cost compatible with the requirements already given.

Although this list does not purport to afford an exhaustive enumeration of all the factors concerned, it probably suffices to show that the problem of their co-ordination is a complex one, and to indicate that the evolution of the ideal expeditionary ration has yet to be achieved.

Rations for a Military Force in the Field.

The first point to be considered is the necessary energy value, and it must be emphasized that habitual underfeeding of an army on active service is bad policy. Not only is the fighting efficiency of the individual thereby reduced, but his increased liability to

sickness, consequent on lowered vitality, involves wastage in numerical strength of the force. Replacement of that wastage takes transport which would be better employed in securing that the men already placed in the firing line are adequately fed.

The data obtained from the experimental march already referred to show that the energy of 3,903 calories provided during the South African war was insufficient and the 1913 field service ration, which replaced it, increased the value to between 4,500 and 5,000 calories.

TABLE I.—British Field Service Ration, 1913.

Article	Amount	Protein	Fat	Carbo-hydrates	Calories
		Grammes	Grammes	Grammes	
Fresh meat	1¼ lb.	83·88	102·59	—	1,298
Or preserved meat	1 ,,	100·59	42·50	—	807
Bread	1¼ ,,	52·14	7·36	300·97	1,516
Or biscuits (8), or flour ..	1 ,,	75·31	6·67	361·35	1,853
Bacon	4 oz.	11·22	76·44	—	756
Tea	⅝ ,,	—	—	—	—
Cheese..	3 ,,	23·56	31·29	3·48	402
Peas	2 ,,	13·95	0·57	35·15	207
Or Beans	2 ,,	12·75	1·02	33·97	201
Or potatoes dried	2 ,,	4·82	0·23	45·87	210
Jam	4 ,,	—	—	88·24	362
Sugar	3 ,,	—	—	76·55	313
Salt	½ ,,	—	—	—	—
Mustard	$\frac{1}{20}$,,	—	—	—	—
Pepper	$\frac{1}{36}$,,	—	—	—	—
Lime juice	$\frac{1}{10}$ gill	—	—	—	—
Rum	½ ,,	—	—	—	—
Tobacco per week	2 oz.	—	—	—	—
Fresh vegetables when available; when these are supplied, peas, beans, dried potatoes, and lime juice will not be issued	½ lb.	—	—	—	70

When fresh meat, bread, and fresh vegetables are issued, calorie value = 4,717.
When preserved meat, biscuits, and dried vegetables are issued, calorie value = 4,704.

Without detailed discussion of its several constituents, the proximate principles and calorie values of the 1913 general field service ration may be used to illustrate how a diet of the necessary energy may be constructed. These are shown in Table I.

Certain innovations—adopted or desirable—may be briefly referred to.

(1) The principle of alternative issues is fully recognized.

(2) The size of the biscuit formerly used called for reduction, and small biscuits, of about the size of the terminal thumb phalanx,

are preferable. The drying stage of manufacture is thus shortened, so that moths are less liable to deposit ova and thus lead to the biscuits becoming weevilly, while small biscuits can be readily stowed in odd corners of the haversack and are more easily masticated.

(3) In future European wars it is probable that motor transport facilities will permit of frozen meat replacing tinned meat, and the latter will be used only for reserve rations.

(4) The provision of travelling field cookers for units will obviate the need for supply of the bulky, but appetizing, tinned rations of meat, gravy and vegetables already cooked and needing only to be warmed before use. The difficulties of preservation of such rations have largely been surmounted, and if they were capable of sufficient concentration they would afford a most desirable alternative issue to corned beef and dried potatoes, in that they give a variety in protein, supply all needs in the one tin, save fuel for cooking, are most savoury and stimulate both appetite and peristalsis—the latter by their large bulk.

As at present made, however, they give a calorie value of only 75·1 per cent of that provided by an equal weight of corned beef and dried potato. This militates against their use in areas where transport considerations are of great importance, although in my opinion the benefits to be anticipated from such an issue, say once a week, would justify the consequent addition to the weight which must be carried.

Such a ration consists of :—

	Oz.	Percentage
Meat—without bone	12	54
Potatoes	5	
Carrots	1	
Haricot beans	1	36
Onions	1	
Stock gravy	2	
Total	22 oz.	

and gives a value of 963 calories.

Reserve Ration.

Not only must provision be made for units when intact, but troops cut off temporarily from the field cookers of their units, or from their supply columns, must also be provided with a small ration sufficient to tide them over such periods. This has led to the construction of the "reserve ration," or its German equivalent

the "iron ration," which is carried by the individual; it suffices to keep him going for twenty-four or forty-eight hours respectively, and is only to be used by order of an officer when all other sources of supply fail.

Limitation of weight makes it possible to provide only some 2,800 calories and Table II indicates the composition and values of the British ration. The fat deficiency of the previous reserve ration has been remedied by the addition of cheese. It is unfortunate that cheese—one of the most valuable and concentrated of all foods—does not keep well and an alternative should be adopted when such is forthcoming.

TABLE II.—British Army Reserve Ration, 1913.

Article	Amount	Protein	Fat	Carbo-hydrates	Calories
		Grammes	Grammes	Grammes	
Preserved meat	12 oz.	100·59	42·5	—	807
Biscuits (6)	12 ,,	56·48	5·0	271·02	1,389
Cheese	3 ,,	23·56	31·3	3·48	402
Sugar	2 ,,	—	—	51·80	201
Tea	$\frac{5}{8}$,,	—	—	—	—
Salt	$\frac{1}{2}$,,	—	—	—	—
Meat extract (2 cubes) ..	1 ,,	—	—	-	—
Total weight	31·125	180·63	78·80	326·40	2,808

The cubes of meat extract not only give a valuable gastric stimulant—invaluable for wounded or exhausted men—but they afford a ready means for making beef-tea in which biscuits may be soaked and rendered more digestible. A little hot water must be obtained for this purpose, but otherwise the requirement that reserve rations should need no cooking has been complied with.

Plasmon and chocolate, which figured in former reserve rations, have been discarded as they were so concentrated as to be relatively indigestible and provocative of thirst.

The weight is shown in Table II as nearly 2 lb., exclusive of the material in which the ration is packed. This adds one-third to the total weight of the ration and a lighter material should be used; packing of the component parts in separate packages would also add to facility of carriage and permit distribution of the component parts among the equipment. If a single metal case be adopted it should be of a flat oval shape in preference to an angular package.

Rations for Polar Expeditions.

On approaching this subject one is confronted by the fact that, while in other zones the study of dietetics has passed progressively from empirical to scientific control, in polar regions the scientific control of empiricism is so slight that the practical experience gained by explorers is of paramount importance and apparently conclusive arguments based on calculation and analogy cannot justifiy radical dietetic innovations which have not been tested by practical trial under arctic conditions. While dietetic empiricism has led to the evolution of diets *proved* capable of maintaining life in polar regions, bromatology has not as yet had a like opportunity. Experimentation is, therefore, not permissible with regard to the essentials of a diet upon which the lives of members of an arctic expedition are unalterably dependent from the day on which they leave the confines of civilization.

The problem is to provide a diet which will serve to keep a party fit for 128 consecutive days and will not exceed in weight thirty-five ounces per man per diem.

(*a*) *Calorie Value.*—That more food is needed under conditions of extreme cold is well known. Increased heat production necessitates more rapid metabolism, which, in turn, involves a proportionate increase in food containing carbon compounds. For this reason fat must form a large proportion of all polar dietaries, as it provides —weight for weight—a higher calorie value than that afforded by other proximate principles.

There are, however, other factors of which few but the explorers themselves have any adequate conception. The intense and sustained muscular effort, want of sleep, the mental tension of constant anxiety and ceaseless vigilance, the dyspepsia and constipation consequent upon a monotonous, imperfectly cooked and highly concentrated diet—all these combine to tax the physical and mental powers to an extent far beyond that indicated by the considerations of heat maintenance and labour demands. This prolonged high tension further indicates that the reparative properties of protein, as compared with those of carbohydrate, should be taken full advantage of in the construction of the dietary—although the calorie values of these proximate principles are similar.

Before proceeding further it may avoid confusion to explain that it is with the expeditionary aspect of the problem of polar rations that we are now dealing. So long as an expedition is on its ship,

or in huts at a base in close touch with the ship, there is available a variety and amount of supplies which reduce the difficulties to the level of those to be met in rationing a ship's company for a prolonged voyage. It is on sledge journeys, when every additional pound of weight to be carried by the individual may mean possibly a matter of life or death, that the problem becomes acute. It is then that the explorer has to balance the vital equation between the work which must be done and the calorie value of the food which can be carried. The former is ever an unknown quantity and the explorer who finds himself with his food supply exhausted and his journey still unaccomplished must needs pass on his longer journey into the greater unknown.

Examination of previous records show that De Chaumont calculated the average daily work per man done by the Nares sledge expedition of 1875 at 534 foot-tons. He remarked, however, that the actual work done appeared to have largely exceeded the theoretical energy value of the diet and Captain Markham, criticizing De Chaumont's data, maintained that 1,000 foot-tons was a more accurate figure.

Adopting the higher estimate it was decided to aim at providing for 1,000 foot-tons of daily labour per man. This is equivalent to 649 calories, and adding 4,851 calories, for heat maintenance and internal work, brings the daily total up to 5,500 calories per man. This gives about 1,000 calories more than was provided by the ration carried during Captain Scott's last antarctic expedition.

(*b*) *Selection of Articles of Diet which will meet all Needs.*—In the selection of articles to comprise the ration attention had to be paid to all the special factors concerned, not the least among which was that of weight, which made it imperative to choose the most concentrated products which would fulfil the special purposes in view. Table III gives the constituents and values of a complete ration.

Protein was the first principle to be dealt with, and this had necessarily to be in concentrated form, for although fresh meat (seal, gull, penguin, or bear flesh) may be available at the base, its high water-content prevented its incorporation in the "sledge ration." The choice of protein lies between that derived from animal sources—such as casein, meat fibre, desiccated egg or pemmican—and that from vegetable sources — such as wheat (gliadine), nuts or biscuits. As all vegetable protein lacks the essential appetizing flavour of meat preparations, and is associated, save in the case of such pure extracts as gliadine, with inert cellulose

TABLE III.

BREAKFAST.

Article	Amount	Moisture	Mineral Matter	Protein	Fat	Carbo-hydrates	Calories
		Grammes	Grammes	Grammes	Grammes	Grammes	
Oatmeal	2 oz.	4.03	0·88	12·94	5·34	33·02	236
Lard	3½ ,,	—	—	—	99·23	—	923
Sugar	½ ,,	—	—	—	—	14·17	58
Beef powder	1½ ,,	0·99	3·85	35·29	2·37	—	166
Gliadine	½ ,,	1·28	0·08	11.78	0·14	0·82	53
Biscuits	1 ,,	3·52	0·30	9·21	0·85	14·45	105
Trumilk	1 ,,	0·13	1·66	6·70	8·00	11·58	150
Sugar (additional), as lump sugar	1½ ,,	—	—	—	—	42·51	174
Total	11½ oz.	9·95	6·77	75·92	115·93	126·55	1,865

LUNCH.

Biscuits..	5 oz.	17·60	1·50	46·05	4·25	72·25	525
Nut-food (+ 1 oz. tru-milk)	6 ,,	6·31	3·81	27·20	54·14	81·03	948
Trumilk	0·25 oz.	0·06	0·41	1·74	1·99	2·90	35
Total	11¼ oz.	23·97	5·72	75·09	60·38	156·18	1,508

SUPPER.

Oatmeal	2 oz.	4·03	0·88	12·94	5·34	33·02	236
Lard	4½ ,,	—	—	—	127·57	—	1,187
Sugar	½ ,,	—	—	—	—	14·17	58
Beef powder	1½ ,,	0·99	3·85	35·29	2·37	—	166
Gliadine	½ ,,	1·28	0·08	11·78	0·14	0·82	53
Biscuits..	1 ,,	3·52	0·30	9·21	0·85	14·45	105
Trumilk	1 ,,	0·13	1·66	6·70	8·00	11·58	150
Sugar (additional), as lump sugar	½ ,,	—	—	—	—	14·17	58
Total	11½ oz.	9·95	6·77	75·92	144·27	126·55	1,139

Meat extract, ½ oz. issued with supper ration.
Tea, ¼ oz. issued with lunch ration.
Concentrated lime juice ½ oz., cerebos salt ⅛ oz., daily.

Total calories per day = 5,512.
Total fat per day = 320·58 grammes.
Total protein per day = 226·93 grammes.
Total carbohydrate per day = 409·28 grammes.

which also checks assimilation, animal protein was selected. The total daily amount is 226·93 grm., which, although a very high figure, appears to be demanded by the special conditions already discussed.

With regard to fat, not only are large amounts desirable on theoretical grounds, but such amounts have in practical experience been consumed without producing digestive disturbance or distaste: the sledge ration of the Nares expedition, e.g., contained no less than 329 grm. of fat. It was decided to provide 320·48 grm. per diem, of which lard contributes roughly fifty-five per cent; nut food thirty per cent, in the form of sesame oil; dried milk ten per cent; while the balance is derived from various sources. It is thus seen that animal fats largely predominate and that lard is the most important contributor. Lard was chosen as being the most palatable form for continuous use; the most readily assimilable; and the most concentrated. It may be noted that concentration depends upon the amount to which the residual water may be reduced without the necessary heat causing charring of the fat. Lard may thus be rendered practically water-free, while the residual water in beef-fat cannot be reduced much below thirteen per cent of the total weight. Another factor which led to the selection of lard is the fact that, owing to its being almost water-free, it keeps better than other fats; if mixed with ten per cent of sugar it has been proved after months of incubation at 37° C. and even after mixture with moulds, to undergo no appreciable change. Butter was discarded on account of the large proportion of water which it contains, and because the large quantity of water necessitates the butter being packed in heavy tins in order to prevent it becoming rancid.

The amounts of protein and fat having been determined upon, the balance of calorie value must be derived from carbohydrate. This has been replaced by fat to the fullest permissible extent, owing to its higher value weight for weight, but a limit is set to this interchange ability by the value of carbohydrate as a sparer of protein; it delays and diminishes muscular fatigue, owing to its rapid oxidation; its bulk also checks the tendency to constipation which is consequent upon adoption of relatively water-free foods.

The carbohydrate to provide the necessary balance of 409·28 grm. is mainly supplied by oatmeal, biscuit, nut-food and sugar, the last of which provides about thirty per cent of the whole. It is important that only the purest sugar should be used and the centrifugalized variety, in cubes, is perhaps the most convenient.

The mineral matter must be dealt with in view of the fact that saline-free melted snow is the only source of water. This results in a deficiency of salts of approximately 1·5 grm. per diem, the deficit being largely of calcium salts, which are important in their action on the blood coagulability and in the promotion of sustained muscular effort. This deficit may be met by the addition of five grammes daily of cerebos salt, which consists of sodium chloride with four per cent of earthy phosphates. It may be noted that the hyper-acidity caused by a diet so rich in protein is checked by calcium liberated from the breaking up of unstable calcium carbamate if ample calcium salts exist in the diet. To ensure that ample provision is made for this purpose, a reserve of four grammes of cerebos salt per head per diem was placed at the disposal of the medical officer. The ration itself gives 25·06 grm. of mineral matter. It provides the necessary ten milligrammes of iron daily, while phosphorus is present in sufficient amount in the cereals, casein, milk powder and biscuit.

The next point demanding attention was that of selection of such dietetic articles as tend to ensure immunity from diseases which have been grouped as "deficiency diseases," of which scurvy and beriberi may be cited as examples. Recent research indicates that each disease of this group is due to dietetic deficiency in a substance ætiologically specific to that disease and such substances have been provisionally named vitamines. All that may certainly be said at present of vitamines is that they are unstable, metabolic, nitrogenous bodies of uncertain composition which are essential to perfect metabolism. It has been considered that in fresh foods the salts are in a state of dissociation, and thus contain the dissociated ions necessary to metabolic processes, while that state of dissociation is disturbed by certain methods of preservation and especially by exposure to high temperatures. Cabbage juice, e.g., loses its antiscorbutic properties when heated to 60° C. and the vitamines of beriberi are destroyed in rice at 120° C.

There is much valuable work being done on the nature of these bodies, and Dr. E. A. Cooper of the Lister Institute has very kindly ascertained for me that desiccated yeast has the property of curing pigeon beriberi.

The most important deficiency disease with which we are now concerned is scurvy. While we have little knowledge of the vitamines of this disease, it is certain that they are contained in green foods, which are both protective and curative. The first consideration therefore is the extent to which fresh green food

can be supplied at the base, both to ensure that the expeditionary party is in perfect health when they start off on their sledge journey, and that they have a certain amount of fresh green food to take with them.

A temperature of 50° F. may be counted upon in the ship or huts at the base and incandescent lamps provide the necessary light, so that seeds such as oats, barley, mustard and cress, and rape can be made to germinate on moistened textiles and their green shoots can be reaped in successive crops.

On the datum that guinea-pigs need between $\frac{1}{150}$ and $\frac{1}{350}$ of their body-weight of fresh cabbage daily as an anti-scorbutic, a man should need daily from 7 oz. to 16 oz., but for short periods it is probable that 7 oz. every third day might suffice. The smaller amount will probably be obtainable at the base and should be compressed for addition to the sledge ration, but it is obvious that this must not be relied on. On the other hand, the idea that dried vegetables (as ordinarily preserved), jam, bread and preserved meat possess anti-scorbutic properties must be discarded, although an ample supply of potatoes, onions, turnips, cranberries, &c., will form part of the supplies for ship and base rations. It has been found that if cabbage juice, dried *in vacuo* over sulphuric acid at 37° C., be kept *in vacuo* it retains its anti-scorbutic properties for one and a half years, but the value of this discovery is discounted by the fact that as much of the dried juice is required as of the fresh cabbage —i.e., a daily ration of $\frac{1}{125}$ of the body weight.

We are thus driven to rely mainly upon lime-juice as the most convenient concentrated product for our purpose. The first question regarding lime-juice is the extent to which the water may be reduced with safety. The eighty-seven per cent of water in the commercial product may be reduced, by cold extraction, to ten per cent without destruction of the essential vitamines and without loss of solubility. The resulting semi-solid extract retains its flavour, keeps well at laboratory temperatures, and has the advantage of being less liable to freeze and burst the bottles. If made into cubes by addition of gelatine this danger would be wholly obviated, while slow sucking of the cubes would aid digestion by promoting a free flow of saliva after the main meals of concentrated and comparatively water-free foods.

It is interesting to note that a similar suggestion is found in the records of an investigation into the causes of scurvy on the Nares Arctic Expedition in 1875. Dr. Donnet and Dr. Fraser (now Sir Thomas Fraser, of Edinburgh University) suggested that lime-juice

be evaporated to five per cent bulk and preserved by addition of sugar and rum or glycerol and then made into lozenges. No opportunity arose for practical tests of these suggestions.

Having discussed the above requirements, it may be interesting to take next the forms in which the requisite proximate principles have been worked into the ration and the reasons why certain articles have been omitted.

One of the staple items of polar menus is "hoosh," which can conveniently consist of fat, oatmeal, meat fibre and sugar. This forms a sort of porridge which is readily prepared, is most appetizing, and does not tend to produce distaste when partaken of for long periods. The bulk of the fat is taken in this form, and the lard neither separates out on cooking, nor imparts its peculiar flavour to the "hoosh," which forms the staple item for breakfast and supper, while mastication is provided for by biscuit. The biscuit further affords the necessary bulk and the cellulose which is needed to prevent occurrence of constipation. It is the necessity for this inert bulk which makes it improbable that reliance upon tabloid foods alone will ever become practicable. The biscuits are made from baked wholemeal flour and have not been seasoned by addition of protein, as this has been found to induce distaste after prolonged consumption. Tea is taken with these meals and sufficient desiccated milk is provided to add to the tea or to be taken with the "hoosh" as may be preferred. This milk, containing only 2 per cent of water, is an ideal concentrated form for the purpose, as 2 oz. of the dried product gives 50 oz. of good milk which is practically indistinguishable from the fresh variety.

Biscuits and milk again form part of the mid-day meal, but variety is secured by substitution of nut-food for "hoosh." The nut-food consists of almonds, sesame seeds and oil and gives a palatable preparation, similar to nougat, which was much appreciated during a recent preliminary trial of the rations in Norway.

The division of the ration into daily meals is shown in Table III, and it is seen there that concentrated lime juice, meat extract and cube sugar are provided, with cerebos salt as an accessory. It is necessary to add to the ration some form of concentrated soup or meat extract, so that this may be available as an invaluable gastric adjuvant immediately after the arrival of the party at its camping ground, when the men feel the stress of their long day's work most acutely. The cube of meat extract may either be sucked, or made into a pint of beef-tea as soon as hot water is ready. The lime-juice and cerebos salt have already been discussed. The omission of

three items which have figured so prominently in former polar rations may call for comment. The first is pemmican, which consists of dried, powdered meat-fibre mixed with sixty-three per cent of beef-fat and has a high calorie value—3,316 calories per pound—besides being palatable. This has been omitted on account of the difficulty of preserving it referred to previously, consequent upon the amount of water which remains in the beef-fat.

Next comes chocolate, and this was omitted because it promotes thirst and because it requires a large expenditure in assimilation, owing to the melting point of its natural fat being higher than that of the body temperature.

Finally comes alcohol, which has been wholly omitted. The following quotation may be made from the paper by Drs. Donnet and Fraser already alluded to: "It is a significant fact in the history of the recent expedition that the first two cases of scurvy occurred in men who were addicted to an immoderate use of alcohol and who had not been exposed to the determining conditions that existed during sledge travelling. It appears also that in former arctic expeditions scurvy has occurred in men who indulged in alcohol to excess, while at the same time the disease was not prevalent among the rest of the crew. From the nature of the injurious action on nutrition of alcohol taken in immoderate quantity, it may be assumed that when so used it becomes a powerful predisposing cause of scurvy. . . . It is a remarkable fact that the men employed in the Hudson Bay Company's service, who rarely drink alcohol in any form, enjoy almost complete immunity from this disease, notwithstanding prolonged exposure to an arctic climate and fatiguing sledge journeys which on some occasions have lasted for several months."

As compared with tea, alcohol has, in my opinion, the only advantage of requiring no preparation. On the other hand, men find that they can work longer and harder after luncheon, if tea be included, than they can during the morning. Tea is less liable than coffee or cocoa to produce distaste, and the exhausted leaves may themselves be eaten and give bulk to the food should further bulk be necessary. They possess, however, none of the anti-scorbutic properties with which tradition has credited them.

(*c*) *Portability.*—In this connection the only simplifying factor is that water is always available within the regions of perpetual snow, and this enables the percentage of water in the ration to be reduced to the minimum which will leave the nutritive value

unimpaired. On the other hand, snow-water lacks the saline constituents of ordinary potable water.

The necessity of providing a calorie value of 5,500 calories in a weight of thirty-five ounces being admitted, this has been

TABLE IV.—RATIONS FOR SLEDGE PARTIES OF H.M.S. "ALERT" AND "DISCOVERY," NARES ARCTIC EXPEDITION, 1875.

Articles	Amount	Fat	Protein	Carbo-hydrates	Calories
		Grammes	Grammes	Grammes	
Pemmican	16 oz.	253·80	158·6	—	3,013
Biscuits	14 ,,	2·90	46·0	299·04	1,436
Bacon	4 ,, *	76·44	11·22	—	756
Potatoes	2 ,,	0·23	4·82	45·87	210
Rum	½ gill	—	—	—	—
Chocolate	1 oz.	4·20	1·4	19·06	122
Sugar for ditto	½ ,,	—	—	14·17	58
Tea†	½ ,,	—	—	—	—
Sugar for ditto	1½ ,,	—	—	42·51	174
Stearine..	3 ,,	—	—	—	—
Spirits of wine	1 ,,	—	—	—	—
Tobacco..	½ ,,	—	—	—	—
Salt	⅛ ,,	—	—	—	—
Pepper	$\frac{1}{10}$,,	—	—	—	—
Onion and curry powder ..	¼ ,,	—	—	—	—
Actual weight of food ..	39½ oz.	337·57	222·04	420·65	5,769

* Increased in some cases to 6 oz. in lieu of pemmican.

† Double allowance of tea was carried in lieu of rum.

TABLE V.—SCOTT ANTARCTIC "SLEIGH RATION."

Article	Amount	Fat	Protein	Carbo-hydrates	Calories
		Grammes	Grammes	Grammes	
Pemmican	8 oz.	126·9	79·30	—	1,506
Biscuits..	14 ,,	2·9	46·00	299·04	1,436
Sugar	5 ,,	—	—	141·78	580
Tea	½ ,,	—	—	—	—
Raisins	2 ,,	1·70	1·30	18·80	180
Cocoa	½ ,,	2·10	0·70	9·53	63
Chocolate	2 ,,	8·40	2·80	38·12	245
Total	32 oz.	142·00	130·00	507·2	4,010

met by the formulation of a diet in which the residual moisture has been reduced to five per cent of the total weight. The ration thus compares favourably with previous sledge rations, for that

carried on the Nares expedition weighed thirty-nine ounces, while that of the last antarctic expedition under Captain Scott provided 1,000 calories less potential energy, although it weighed an ounce less than that now being described. The rations of these expeditions are shown in Tables IV and V for comparison. Reduction of water not only diminishes weight but has the advantage of lessening the disintegration which follows the freezing of all foods not wholly water-free, when exposed to temperatures sometimes as low as $-70°$ C.

The use of foods which have to be packed in such heavy materials as tin must necessarily be avoided, and articles substituted which, on account of being practically water-free, are not liable to decomposition at the uniformly low temperatures at which they can be maintained throughout. The articles which constitute the "hoosh" and the nut-food may be safely packed in such light wrappings as grease-paper. The lard, which forms so large a proportion of the ration, has already been stated to resist decomposition and may be packed in bladders or in sausage-skins.

(*d*) *Ease of Preparation.*—For polar expeditions it is obvious that rations which require cooking, in the full sense of the word, are inadmissible. All that can be done on the line of march is to raise the ration to boiling point before putting out the stove, but hot water is obtainable thrice daily as a means of dissolvng the dried milk and making tea.

The "hoosh" merely needs addition of water and heating to the boiling point in one mass, while the nut-food and biscuit need no preparation. The "hoosh" consists of oatmeal two ounces, lard three and a half ounces, sugar half an ounce, meat powder one and a half ounce, and gliadine half an ounce, mixed together in packing to form a semi-solid mass which requires addition of one pint of water and heating to the boil to make an appetizing meal. The semi-solid mass is made up in packages of the appropriate weight and keeps indefinitely if packed in bladders, which may be eaten if more bulk be required—thus avoiding the carriage of any useless material whatsoever. This further saves delay and difficulty in serving out the daily rations in appropriate amounts.

Remaining Factors.—Of these little remains to be said. Certain factors which control the rations for military expeditions—such as facilities for replenishment, cost, etc.—are not applicable in the case under review. The questions of divisibility, variety, climatic applicability and preservation have been dealt with already. The only remaining point is that the ration should be composed of

articles to which the men have been accustomed. To a certain extent this is met by the fact that members of the expedition will have become accustomed to some of the constituents of their ration during the period of preparation at the base. Otherwise the brief and definite duration of the sledge journey is such as to make it more important to get the men in the best condition possible by a generous and varied diet up to the actual date of starting than to attempt to accustom them in advance to the diet upon which they must solely rely on the sledge trip.

It is impossible to refrain from concluding this section without a tribute to the quality of the courage which upholds those who undertake the exploration of frozen zones, and to the attention to minutiæ in preparation which has so vital a bearing upon the question of success or failure—life or death.

THE TREATMENT OF SYPHILIS WITH SALVARSAN.[1]

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Three years ago when we first had the honour of addressing a section of the British Medical Association on the subject of salvarsan the question which concerned us was whether salvarsan is a specific remedy against syphilis. To-day it is not a question of whether or not we should give salvarsan, but how much of it we should give so as to secure the best results.

It is true that there still exist opponents of salvarsan, some of them, too, syphilologists of great eminence, but they are in an ever-diminishing minority. For us who have used this remedy as a routine measure for four years the evidence of our now almost empty syphilis ward at Rochester Row is sufficient. If we doubted the value of salvarsan we need only carry our minds back to the days when mercury and potassium iodide were practically our only resources. Then our wards were full of patients whose lesions were constantly recurring and who spent long periods in hospital after each fresh admission. Now our syphilis patients occupy a small portion of one ward, and they are only the fresh infected cases. If this were not sufficient we have the memory of many patients now restored to health whose syphilitic lesions were the despair of their medical officers who had tried every known method of giving mercury to them. In the place of 315 clinical relapses within the first year out of 371 cases of syphilis treated with mercury alone, we now have 9 clinical relapses out of 285 cases treated with salvarsan and mercury. The purely mercurial cases were treated regularly throughout the year, the salvarsan and mercury cases were mostly treated for only the first three months. We have yet to experience our first casualty after giving more than 3,900 injections, and out of 4,425 injections given by officers in seven large stations in the United Kingdom, from whom we have received reports, only one death has been experienced. This, in fact, is the only death from salvarsan which has been reported to the War Office

[1] Paper read at Aberdeen on July 30, 1914, at the Annual Meeting of the British Medical Association.

since its introduction, with the exception of one death in India from gumma of the brain a few days after an injection. We have had only two cases of cranial nerve disturbance in cases treated with salvarsan. Both these received much less salvarsan than we are in the habit of giving, and both made a complete recovery under salvarsan and mercurial treatment. They simply emphasize the necessity of giving sufficient of the remedy. This general evidence of the value of salvarsan seems to us sufficient introduction to a discussion on the best method of using it to obtain the maximum benefit. A study of recent literature on salvarsan shows that although investigators have arrived at many points of agreement there are still a number on which they are by no means unanimous. Thus all are agreed that it is useless, and even dangerous, to be content with the administration of one dose, and that the earlier treatment is commenced the less salvarsan will be required to bring about a cure. An illustration of this will be found in the two bottom rows of figures in the four tables, where it will be seen that the relapses of primary cases were considerably less than those of secondary cases under identical forms of treatment. Two main points on which investigators are not yet agreed are: (1) whether we should trust to salvarsan alone or use it in combination with mercury in some form; and (2) what amount of salvarsan, or salvarsan and mercury, should be administered before treatment is suspended. We think it will be useful to devote the main part of our paper to a discussion on these points. It is natural that there should be disagreement on these questions because their solution depends on the permanence of results obtained by each plan of treatment, and many workers have not the opportunity of judging this. They almost invariably obtain excellent immediate results whatever plan they adopt, but then their patients disappear and their history even after a few months is unknown. We have considered that we could best assist in the solution of these problems by using our opportunities of following up our cases to the utmost, and the results are detailed in the tables. With regard first to the question of salvarsan alone versus salvarsan and mercurial treatment. The majority of syphilologists seem to agree with Neisser, Gennerich and many others that the combined treatment gives the most permanent results, while Wechselmann brings his great experience to the support of those who advocate salvarsan only. As a sidelight on this question, at the International Congress in London last year Dr. Lévy-Bing stated his belief that salvarsan will not abort

syphilis. In support of his contention he related the histories of ten cases of early primary syphilis, cases, that is, which were especially favourable to the abortive treatment, which had been treated with salvarsan or neosalvarsan, and of which nine had relapsed clinically, while the tenth had subsequently given a positive Wassermann reaction. The special points of note about these cases are that only salvarsan or neosalvarsan was administered, and with the exception of the patient who did not relapse clinically, the maximum amount of salvarsan administered to any case was 2·4 grm. Subsequently Guiard contributed a paper to *Les Annales des Malades Vénériennes* which was intended to be an answer to Lévy-Bing's contention. He pointed out that the amount of salvarsan administered by Lévy-Bing was much too small and, after relating the histories of a similar number of cases treated with satisfactory results by injecting about twice as much salvarsan, he mentioned other cases treated with the smaller quantity of salvarsan used by Lévy-Bing which had been followed by a high percentage of relapses. Advocating the subcutaneous injection of neosalvarsan, Wechselmann, who is a staunch advocate of purely salvarsan treatment, has recently said (*Münch. med. Wochenschr.*, No. 10, 1914) that having committed himself to purely salvarsan treatment he found it necessary to find a method of giving salvarsan which would produce the same results in the same time as the combined method. This he practically admitted he could not do with intravenous injections. Our own results with 1·2 to 1·8 grm. salvarsan in conjunction with mercury are undoubtedly considerably better than those of Lévy-Bing, who gave the same amount of salvarsan without mercury, and seem to us to be as good as, if not better than, those of Guiard, who gave at least twice as much salvarsan, and a study of our tables will show generally that the same amount of salvarsan will effect much more in combination with nine or ten injections of mercury than when mercury is omitted. It seems to us clear, therefore, that if purely salvarsan treatment will cure syphilis it requires much more of it than when mercury is also administered; so that on purely economical grounds, if on no other, the combined method has distinct advantages.

The question of the minimum amount of treatment to be administered before it is suspended is, in our judgment, considerably more difficult. If, on the one hand, we had not to consider the economical side of the question or if, on the other, syphilitic relapses were incidents of minor importance, the question would be

simple enough. We would then either prescribe a prolonged series of salvarsan and mercurial courses far beyond what we knew was necessary for the average case or treat the patient only when fresh symptoms arose. Neither of these courses is possible with the average case; the first for obvious reasons of economy and the second because syphilitic relapses, as is well enough known, may cost the patient his life or bring his career to a close in a manner which is worse than killing him. It is true that syphilitic relapses, with the exception of tabes and general paralysis, are much more amenable to treatment now than when we could only rely on mercury and the iodides, but we have always before us the fear that the patient may develop tabes or general paralysis at a later date, and for this reason it seems to us that we should aim at framing the initial course so that, by an economical expenditure of time and of this rather expensive remedy, we may reduce the number of relapses within a period of two years to the lowest possible limit. Even then we shall not be certain for many years what will be the outcome. The Wassermann test, though an enormous advance on our old diagnostic methods, will not tell us whether the *Spirochæta pallida* is dead or only asleep, and it often fails to tell us of an active process in the central nervous system. It is true that with regard to the latter we can always examine the cerebrospinal fluid, but we think it will be a long time before we have educated our patients to submit to lumbar puncture as a routine part of their treatment. We have attempted to solve this problem with a proper regard to economy, since we knew that each additional full dose of salvarsan, recommended as the minimum to be administered to each fresh case of syphilis, would cost the Government many hundreds of pounds more per annum. At the same time we have not lost sight of the fact that we must eventually recommend an amount which will render the highest percentage of syphilitic soldiers free from relapse within the longest period of observation at our disposal. Working on these lines, we have gradually increased the length of the initial course and the amount of salvarsan and mercury administered in it. The results are shown in the tables, in which we have accounted for every fresh case of syphilis we have treated with the exception of those to whom we administered intramuscular injections of salvarsan. We shall not enter in any great detail into the particulars shown in the tables, since this would not serve any useful purpose, but will explain a few of the more important points which they illustrate. With regard to the several lines of treatment which we have investigated,

these are detailed on the left-hand side of each table in the chronological order in which they were tried, and opposite to each, under headings which explain themselves, are the figures illustrating the result of each line of treatment. In the case of patients treated with salvarsan only the injections were given at fortnightly intervals. In the course consisting of three salvarsan and four calomel injections, the salvarsan was administered at fortnightly intervals and the calomel concurrently at weekly intervals. In the course consisting of two salvarsan and nine mercurial injections the salvarsan injections were given at an interval of nine weeks during which mercury was administered at weekly intervals; and in that consisting of three salvarsan and ten mercurial injections the first injection of salvarsan was followed by five weekly injections of mercury, then another of salvarsan, five more injections of mercury, and lastly an injection of salvarsan. Except where mentioned in the tabes the individual dose was 0·6 grm. Our reasons for spacing out the salvarsan injections in the combined courses have been explained by us before. From a practical point of view this method seems to us to have the advantage that a safe interval is left between full doses, without giving the spirochætes a chance of making headway in the interval. For reasons which we have detailed in previous papers on this subject, we do not think it altogether safe to give full doses of salvarsan at shorter intervals than a fortnight or rather more, and we think also that the length of time over which a course is prolonged influences the result of the treatment; this being better after a course lasting nine or ten weeks than one lasting only a month. We have no *certain* evidence of this, but the results of the two salvarsan and nine mercury course were slightly better, as shown in the tables, than those of the three salvarsan and four calomel course, which lasted only a month. The results detailed in the tables show a progressive improvement, till with the latest course of three salvarsan and ten mercurial injections the clinical relapses have been reduced to two. One of these gave a positive Wassermann three months after the termination of the course, but deserted from the Service when required for further treatment, returning later with a clinical relapse. It is reasonable to suppose that if he could have received a further course of treatment, such as we administer to all cases which give a positive reaction subsequently to the initial course, he would not now figure in the clinical relapse column. The Wassermann relapses following the course of two salvarsan and nine mercurial injections are higher than those we showed for the same course

last year. This we think is due to the fact that acting on the discovery of Jacobsthal, confirmed by one of us (L.W.H.) amongst others, that certain sera bind complement better in the cold than at 37° C., and by the use of cholesterinized extracts we have made the Wassermann test as carried out in the Rochester Row laboratory more delicate in the sense of detecting a larger percentage of positive reactions amongst syphilitic sera. This is shown by the fact that for over a year every secondary untreated case of syphilis has given a positive reaction against 96·4 per cent in previous years. It spoils our statistics, but that is of no moment. Its chief importance here is that it narrows the difference between the results of purely salvarsan and the two later forms of combined treatment, since the cases treated with salvarsan alone were tested by the older method. Another point which is brought out by the tables is the fact already mentioned that primary cases relapse less numerously than secondary under the same treatment. An interesting point not brought out in the tables is that our primary cases which had remained free from signs for a year from the termination of treatment did not relapse later, unlike the secondary cases, one of which remained free from all signs for nineteen months and then gave a positive Wassermann reaction. A similar observation has been made by Gennerich. Lastly, we would refer to Section V of our Appendix in which is detailed the results of treating relapse cases with various courses of treatment. It is quite plain from the figures shown in this section, that relapse cases require much more treatment than either primary or secondary cases. This not only confirms the observations of others, but is worthy of emphasis, since the tendency is to believe that when the relapse is simply in the form of a positive Wassermann reaction a dose or two of salvarsan will be sufficient, and it cannot be emphasized too strongly that relapse cases must be treated on even more strenuous lines than secondary. This is the more important since Gennerich has shown that 90 per cent of relapse cases show changes in the cerebrospinal fluid. This is not peculiar to cases treated with salvarsan, because it occurred also in those treated only with mercury. Possibly the importance of fluid changes has been rather exaggerated, since by no means 90 per cent of patients who were syphilized years ago are being wheeled about in bath chairs, inefficiently treated though the majority of them must have been. The healing power of Nature must have saved the majority of them from disaster, but it is our duty not to rely too greatly on this and to leave as little to chance as possible. In comparison with

our results, those of Gennerich are undoubtedly much better, and our chief consolation for the fact that we show a larger percentage of relapses than he does, is that others besides ourselves will now know what can be done with less strenuous courses of treatment than those recommended by Gennerich.

Gennerich's latest course consists of six to eight salvarsan injections (0·4 to 0·5 grm.) and ten to fifteen calomel injections for primary cases with negative blood reaction. For those where the Wassermann reaction has already become positive, as well as for early secondary cases, this treatment is supplemented by a follow-up course of six to seven calomel and salvarsan injections. Employing this treatment, he has obtained the following results with cases which were observed for not less than one year from the termination of the treatment. Counting any change in the cerebro-spinal fluid after a provocative injection as a relapse, there were three Wassermann relapses out of 92 primary cases; four Wassermann relapses out of 70 early secondary cases; one out of 11 cases of late secondary syphilis; none out of 8 tertiary cases, and one out of 43 latent cases.

Considering that every known method of examination, including lumbar puncture, was used to detect relapses, we consider that no form of treatment has yet been devised for syphilis which has given such fine results, and they mark more than anything else the enormous advance in the therapy of syphilis which Ehrlich's discovery has made.

As to the line of treatment we are now investigating, we distinguish between early primary cases with a negative Wassermann reaction and those with a positive reaction, including early secondary cases. To the former we are giving eight injections of 0·3 grm. salvarsan and eight injections of mercury, and to those with a positive reaction the same course is repeated after a month's interval. This course will be considerably less convenient from the Service point of view than any we have hitherto tried, since it will interfere much more with the soldier's duties. We hope to mitigate this in some ways. For instance, we hope that after such a small dose the reaction will be so slight, if any, as to allow of the soldier returning to his barracks on the evening of the injection. Another difficulty is with soldiers transferred to central stations for salvarsan treatment. Formerly this meant only three journeys, since the mercurial injections were administered at the patient's own station. With a view of overcoming this difficulty we are now treating a series of cases on the above lines, but with neosalvarsan

in concentrated solution. If this proves a success it will be possible to dispense with the journeys, since the technique is so simple that the treatment can be carried out at any station. Incidentally, it will help also to settle the vexed question as to whether in corresponding doses neosalvarsan is therapeutically as potent as the older remedy.

By Professor Ehrlich's kindness we have had an opportunity of trying the newer preparation of salvarsan known as salvarsan-natrium, of which we have given about 150 doses. In convenience of preparation it corresponds to neosalvarsan, as no alkali has to be added to the solution. Otherwise it is given practically in the same manner as the older preparation. We have not noticed any difference in the therapeutic results, and, as far as we can see, reactions occur about as frequently after salvarsan-natrium as after salvarsan.

In conclusion we wish to acknowledge the great help which we have received from our colleagues in the collection of our statistics, and especially from Major T. F. Ritchie, R.A.M.C., who has spent many hours in gathering the results which are detailed in the Appendix.

TABLE I.—Showing the Numbers of Previously Untreated Cases of Syphilis which were Treated with Salvarsan, and with Salvarsan and Mercury, the Numbers which remained free from Signs, Clinical or Serological, and those which relapsed after each Form of Treatment within Six Months of the Termination of the Course.

Treatment		Total cases	Left the Army before the end of the period; or finished the course less than 6 months ago	Number which remained free from clinical signs		Number which remained free from signs, clinical or serological		Relapses			Reinfections
				Number of cases	Per-centage	Number of cases	Per-centage	Clinical	Wassermann	Total	
One intravenous of 0·60 grm. salvarsan	Primary..	0	0	0	0	0	0	0	0	0	0
	Secondary	5	0	3	60	2	40	2 (4)	1 (4)	3	—
Two intravenous of 0·6 grm. salvarsan	Primary..	9	0	8	88·8	8	88·8	1 (2)	0	1	—
	Secondary	20	1 (F.)	19	100	14	73·7	0	5 (1, 6, 3, 1, 3)	5	—
Four intravenous (0·6, 0·3, 0·3, 0·3) salvarsan	Primary..	15	1 (F.)	14	100	11	78·6	0	2 (6, 5)	2	1
	Secondary	22	2 (F.)	18	90	14	71	(2, 5)	4 (3, 5, 5, 5)	6	—
Three salvarsan and four calomel	Primary..	24	1 (F.)	22	95·6	20	86·9	1 (5)	2 (3, 3)	3	—
	Secondary	41	1	39	97·5	32	80	1 (5)	7 (2-6)	8	—
Two salvarsan and nine mercury	Primary..	90	38 (F.)	49	94·2	47	90·4	3 (6, 6, 1½)	2 (6, 2½)	5	—
	Secondary	105	11 (F.)	89	94·7	73	77·7	5 (1½, 6)	16 (2-6)	21	—
Three salvarsan and ten mercury	Primary..	106	49 (48 F., 1 W.P.	56	98·3	52	91·2	1 (6)	4 (3-5)	5	—
	Secondary	132	59 (F.)	72	98·6	58	79·4	1 (5)	14 (3-5)	15	—
Totals treated with salvarsan only								Percentage	Percentage	Percentage	
	Primary..	24	1	22	95·6	19	82·6	1 = 4·3	2 = 8·7	3 = 13	1
	Secondary	47	3	40	98 2	30	68·2	4 = 9	10 = 22·7	14 = 31·8	—
	Primary and Secondary	71	4	62	92·5	49	73·1	5 = 7·4	12 = 17·9	17 = 25·3	1
Totals treated with salvarsan and mercury	Primary..	220	88	127	96·3	119	90·1	5 = 3·7	8 = 6	13 = 9·8	—
	Secondary	278	71	200	96·6	163	78·7	7 = 3·3	37 = 17·8	44 = 21·2	—
	Primary and Secondary	498	159	327	96·4	282	83·2	12 = 3·5	45 = 13·3	57 = 16·8	—
Total primary		244	89 (88 F., 1 W.P.)	149	96·1	138	89·0	6 = 3·9	10 = 6·4	16 = 10·3	1
Total secondary		325	74 (all F.)	240	95·6	193	76·9	11 = 4·4	47 = 18·7	58 = 23·1	—

TABLE II.—SHOWING THE NUMBERS OF PREVIOUSLY UNTREATED CASES OF SYPHILIS WHICH WERE TREATED WITH SALVARSAN, AND WITH SALVARSAN AND MERCURY, THE NUMBERS WHICH REMAINED FREE FROM SIGNS, CLINICAL OR SEROLOGICAL, AND THOSE WHICH RELAPSED AFTER EACH FORM OF TREATMENT WITHIN NINE MONTHS OF THE TERMINATION OF THE COURSE.

Treatment		Total cases remaining at end of 6 months	Left the Army after 6, but before 9 months from termination of course, or finished the course between 6 and 9 months ago	Number which remained free from clinical signs		Number which remained free from signs, clinical or serological		Relapses			Reinfections
				Number of cases	Percentage	Number of cases	Percentage	Clinical	Wassermann	Total	
One intravenous of 0·6 grm. salvarsan	Primary..	0	0	0	0	0	0	0	0	0	0
	Secondary	5	0	3	60	2	40	2 (4)	1 (4)	3	0
Two intravenous of 0·6 grm. salvarsan	Primary..	9	0	8	88·8	7	77·7	1 (2)	1 (8)	2	—
	Secondary	19	3 (2 W.P., 1 F.)	15	93·7	11	68·7	1 (7)	4 (1-7)	5	—
Four intravenous (0·6 0·3,0 3,0·3)salvarsan	Primary..	14	2 (1 W.P., 1 F.)	12	100	10	83·3	0	1 (5)	1	1
	Secondary	20	1 (W.P.)	17	89·4	12	63·2	2 (2, 5)	4 (3-5)	6	1.
Three salvarsan and four calomel	Primary..	23	1 (F.)	21	95·5	18	81·9	1 (5)	3 (3, 3, 7)	4	—
	Secondary	40	3 (F.)	36	97·3	26	70·2	1 (5)	10 (2-8)	11	—
Two salvarsan and nine mercury	Primary..	52	5 (F.)	44	93·6	40	85·1	3 ($1\frac{1}{2}$, 6, 6)	3 (6, $2\frac{1}{2}$, 7)	6	1
	Secondary	94	6 (5 F., 1 W.P.)	83	94·3	65	73·8	5 ($1\frac{1}{2}$-6)	18 (2-9)	23	—
Three salvarsan and ten mercury	Primary..	57	19 (F.)	37	97·4	32	83·1	1	5 (3-9)	6	—
	Secondary	73	18 (16 F., 1 W.P., 1 R.)	55	100	41	74·5	0	14 (3-9)	14	—
								Percentage	Percentage	Percentage	
Totals treated with salvarsan only	Primary..	23	2 (1 W.P., 1 F.)	20	95·2	17	80·9	1 = 4·7	2 = 9·5	3 = 14·3	1
	Secondary	44	4 (3 W.P., 1 F.)	35	87·5	25	62·5	5 = 12·5	9 = 22·5	14 = 35	1
	Primary and Secondary	67	6 (4 W.P., 2 F.)	55	90·1	42	68·8	6 = 9·8	11 = 18	17 = 27·8	2
Totals treated with salvarsan and mercury	Primary..	132	25 (F.)	102	95·3	90	84·1	5 = 4·6	11 = 10·3	16 = 14·9	1
	Secondary	207	27 (2 W.P., 1 R, 24 F.)	172	95·5	132	73·3	6 = 3·3	42 = 23·3	48 = 26·6	—
	Primary and Secondary	339	52 (2 W.P., 1 R., 49 F.)	176	96·2	222	77·3	11 = 3·8	53 = 18·4	64 = 22·3	1
Total primary		155	27 (1 W.P., 26 F.)	122	95·3	107	83·6	6 = 4·7	13 = 10·1	19 = 14·8	2
Total secondary		251	31 (5 W.P., 1 R., 25 F.)	209	95	157	71·4	11 = 5·0	51 = 23·2	62 = 28·2	1

The figures in brackets after numbers of relapses indicate the numbers of months after terminations of courses when the relapses occurred. The letter "F." in brackets signifies free from signs when last examined; "W.P." signifies that the patient had given a positive reaction after the termination of the course, and had, therefore, required further treatment; "R." signifies that the patient had relapsed clinically.

TABLE III.—SHOWING THE NUMBERS OF PREVIOUSLY UNTREATED CASES OF SYPHILIS WHICH WERE TREATED WITH SALVARSAN, AND WITH SALVARSAN AND MERCURY, THE NUMBERS WHICH REMAINED FREE FROM SIGNS, CLINICAL OR SEROLOGICAL, AND THOSE WHICH RELAPSED AFTER EACH FORM OF TREATMENT WITHIN TWELVE MONTHS OF THE TERMINATION OF THE COURSE.

Treatment		Total cases remaining at end of nine months	Left the Army after 9, but before 12 months from termination of course, or finished course between 9 and 12 months ago	Number which remained free from clinical signs		Number which remained free from signs, clinical and serological		Relapses			Reinfections
				Number of cases	Percentage	Number of cases	Percentage	Clinical	Wassermann	Total	
One intravenous of 0·6 grm. salvarsan	Primary..	0	0	0	0	0	0	0	0	0	—
	Secondary	5	0	3	6	2	40	2 (4)	1 (4)	3	—
Two intravenous of 0·6 grm. salvarsan	Primary..	9	2 (1 F., 1 W.P.)	6	85·7	5	71·4	1 (2)	0	1	1
	Secondary	16	3 (2 F., 1 W.P.)	12	92·3	8	61·5	1 (7)	4 (3-11)	5	—
Four intravenous (0·6, 0·3, 0·3, 0·3) salvarsan	Primary..	12	1 (W.P.)	11	100	10	90·9	0	0	0	1
	Secondary	19	3 (F.)	13	81·2	7	43·7	3 (2, 5, 12)	5 (3-12)	8	1
Three salvarsan and four calomel	Primary..	22	0	21	95·5	18	81·8	1 (5)	3 (3, 3, 7)	4	—
	Secondary	37	1 (F.)	35	97·2	22	61·1	1 (5)	13 (3-11)	14	—
Two salvarsan and nine mercury	Primary..	47	3 (F.)	41	93·3	37	84·0	3 (6, 6, 1½)	3 (6, 2½, 7)	6	1
	Secondary	88	5 (1 W.P., 4 F.)	77	92·8	55	66·3	6 (1½-12)	22 (2-12)	28	—
Three salvarsan and ten mercury	Primary..	38	18 (1 R., 17 F.)	20	100	14	70	0	6 (3-10)	6	—
	Secondary	55	29 (7 W.P., 22 F.)	26	100	19	73	0	7 (3-9)	7	—
								Percentage	Percentage	Percentage	
Totals treated with salvarsan only	Primary..	21	3 (2 W.P., 1 F.)	17	94·4	15	83·3	1 = 5·5	0 = 0	1 = 5·5	2
	Secondary	40	6 (1 W.P., 5 F.)	28	82·3	17	50	6 = 17·6	10 = 29·4	16 = 47	1
	Primary and Secondary	61	9 (3 W.P., 6 F.)	45	86·5	32	61·5	7 = 13·4	10 = 19·2	17 = 32·6	3
Totals treated with salvarsan and mercury	Primary..	107	21 (1 R., 20 F.)	62	95·3	69	80·2	4 = 4·7	12 = 13·9	16 = 18·6	1
	Secondary	180	35 (8 W.P., 27 F.)	138	95·1	96	66·2	7 = 4·8	42 = 28·9	49 = 33·8	—
	Primary and Secondary	287	56 (1 R., 8 W.P., 47 F.)	220	95·2	165	71·4	11 = 4·8	54 = 23·4	65 = 28·1	1
Total primary		128	24 (2 W.P., 1 R., 21 F.)	99	95·2	84	80·8	5 = 4·8	12 = 11·5	17 = 16·3	3
Total secondary		220	41 (9 W.P., 32 F.)	166	92·7	113	63·1	13 = 7·3	52 = 29·0	65 = 36·3	1

TABLE IV.—Showing the Numbers of Previously Untreated Cases of Syphilis which were Treated with Salvarsan, and with Salvarsan and Mercury, the Numbers which remained free from Signs, Clinical or Serological, and those which Relapsed after each Form of Treatment within Eighteen Months of the Termination of the Course. Secondary Cases only.

Treatment	Total cases remaining at end of 12 months	Left the Army after 12, but before 18 months from termination of course, or finished course between 12 and 18 months ago	Number which remained free from clinical signs		Number which remained free from signs, clinical and serological		Relapses			R-infections
			Number of cases	Percentage	Number of cases	Percentage	Clinical	Wassermann	Total	
One intravenous	5	1 (R.)	3	75	2	50	1 (4)	1 (4)	2	0
Two intravenous	13	3 (2 F., 1 W.P.)	8	80	5	50	2 (7, 13)	3 (5, 5, 12)	5	—
Four intravenous	16	3 (1 W.P., 2 F.)	10	76·9	5	38·4	3 (2, 5, 13)	4 (5-14)	7	1
Three salvarsan and four calomel	36	3 (2 F., 1 W.P.)	32	96·9	19	57·5	1 (5)	13 (3-14)	14	—
Two salvarsan and nine mercury	83	27 (12 F., 15 W.P.)	50	89·2	38	67·8	6 (1½-12)	12 (2-17)	18	—
Total treated with salvarsan only	34	7 (1 R., 2 W.P., 4 F.)	21	77·7	12	44·4	Percentage 6 = 22·2	Percentage 8 = 29·6	Percentage 14 = 51·8	1
Total treated with salvarsan and mercury	119	30 (14 F., 16 W.P.)	82	92·1	57	64·1	7 = 7·8	25 = 28·1	32 = 35·9	—

One case treated with two salvarsan and nine mercurial injections gave a positive Wassermann reaction at nineteen months. Otherwise no further relapses occurred up to the end of two years.

The figures in brackets after numbers of relapses indicate the numbers of months after terminations of courses when the relapses occurred. The letter "F." in brackets signifies free from signs when last examined; "W.P." signifies that the patient had given a positive reaction after the termination of the course, and had, therefore, required further treatment; "R" signifies that the patient had relapsed clinically.

TABLE V.—EFFECT OF FURTHER TREATMENT ON RELAPSE CASES.

Fourteen cases of clinical or serological relapse were treated with two further intravenous injections of 0·6 grm. salvarsan: 5 remained free from further signs—1 for twenty-one, 2 for eighteen, 1 for fifteen, and 1 for nine months; subsequently 5 gave a positive Wassermann reaction from four to five months later, and 4 relapsed clinically one to thirteen months later.

Ten cases of relapse were treated with one further injection of 0·6 grm. salvarsan; 2 remained free from signs for eighteen and twenty-one months, 3 gave positive Wassermann reactions after three to eighteen months, and 5 relapsed clinically after three to eight months.

Eleven relapse cases were treated with 0·3 grm. salvarsan, nine injections of mercury, and, lastly, 0·3 grm. salvarsan: 5 remained free from further signs—1 for eighteen, 1 for fourteen, and 3 for nine months subsequently; 6 gave a positive Wassermann reaction again after two to eighteen months.

Twenty-nine cases of relapse were treated with a further course of two salvarsan and nine mercurial injections: 18 remained free from further signs—1 for twenty-one, 1 for eighteen, 5 for fifteen, 1 for eleven, 2 for nine, 6 for six, and 2 for three months subsequently; 10 gave a positive Wassermann reaction again after one to fifteen months, and 1 relapsed clinically after eight months.

Six relapse cases were treated with a further course of three salvarsan and ten mercurial injections: 2 remained free from further signs for six and twelve months, 2 gave a positive Wassermann reaction again after one to three months, and 1 relapsed clinically after eleven months.

TABLE VI.—RELAPSES UNDER PURELY MERCURIAL TREATMENT.

Out of 371 cases treated with regular injections of mercury, 151 relapsed once, 115 twice, and 49 three times or more, all clinically, within the first year. Total clinical relapses, 315.

TABLE VII.—OFFICIAL STANDARD OF CURE.

Primary cases treated with salvarsan and having been free from signs, clinical or serological, for one year from the last course of treatment, and secondary cases having been similarly free from signs for two years from the end of the last course, were struck off the syphilis register. In order to test the safety of this, 77 cases (28 primary and 49 secondary) which had been struck off the register were tested later for the Wassermann reaction: 25 after one to six months, 19 after six to twelve months, 21 after twelve to eighteen months, and 12 after eighteen to twenty-seven months. Out of the 28 primary cases none gave a positive reaction at this time, but 6 out of the 49 secondary cases did so. Five of these were originally treated with salvarsan only. None of the 77 cases had a return of clinical signs.

In comparison with this 492 cases, which had been treated with regular courses of mercury for two years and under the old standard of cure would have been struck off the register, were tested three months from the end of the last course of mercurial injections, and 224, or over 45 per cent, gave a positive reaction to the original test.

TABLE VIII.—SAFETY OF SALVARSAN.

Out of 3,900 injections (mostly of 0·6 grm.) at Rochester Row, there has been no death. Officers responsible for the administration of salvarsan in seven principal stations in the United Kingdom report that they have given 4,425 injections, mostly of 0·6 grm. and have had one death (hæmorrhagic nephritis after the second injection). Total injections, therefore, 8,325; total deaths 1. One of the above cases suffered from severe erythema for a few days afterwards, and one had epileptiform convulsions, but recovered.

Cranial nerve disturbance: Two cases initially treated at Rochester Row suffered from cranial nerve disturbance subsequently, one, a case of facial paralysis, in October, 1912, after 0·9 and 1·2 grm. neo-salvarsan on June 18 and 25, 1912, and 0·3 grm. salvarsan on August 17, 1912; the other, facial paralysis, three months after two injections of 0·3 grm. salvarsan. Both these cases made a complete recovery under salvarsan and mercurial treatment.

DESCRIPTION OF A STRAIN OF *TRYPANOSOMA BRUCEI* FROM ZULULAND.[1]

PART II.—SUSCEPTIBILITY OF ANIMALS.

By Surgeon-General Sir DAVID BRUCE, C.B., F.R.S.; Major A. E. HAMERTON, D.S.O., and Captain D. P. WATSON, R.A.M.C.; and Lady BRUCE, R.R.C.

Introduction.

In the foregoing paper the morphology of this trypanosome was described, and the conclusion arrived at that it is identical, as regards shape, size, and general appearance, with the trypanosome causing disease in man in Nyasaland, the *Trypanosoma rhodesiense* of Stephens and Fantham.

This paper describes the action on animals of the Zululand trypanosome, and it is compared in this regard with the Nyasaland species.

Susceptibility of Animals to *T. brucei*, Zululand Strain, 1913.

TABLE I.

Date	No. of expt.	Source of virus	Incubation, in days	Duration, in days[2]	Remarks
		Horse.			
1895 —	37	Dog 4	3	35	"Very old animal: typical Nagana."—Shilston.
Sept. 27 ..	212	Natural infection ..	?	30	Zululand, 1896, Bruce.
,, 29 ..	235	,, ,, ..	6	49	,, ,, ,,
		Average	—	38·0	
		Ox.			
1913 —	22	Dog 4	6	—	"Still alive after 90 days." —Shilston.
Feb. 18 ..	1913	Rat 1839	—	—	Never showed trypanosomes.
,, 18 ..	1914	,, 1839	37	—	Still alive after 316 days.
,, 18 ..	1915	,, 1839	35	310	Died of *T. brucei*.
July 22 ..	2304	Dog 2281	—	—	Never showed trypanosomes.
,, 22 ..	2305	,, 2281	—	—	,, ,, ,,
,, 22 ..	2306	,, 2281	—	—	,, ,, ,,
		Sheep.			
—	1	Dog 4	12	—	"Still alive after 90 days." —Shilston.

[1] Reprinted from *Proceedings* B *of the Royal Society*.

[2] Duration includes the days of incubation; it dates from day of infection.

TABLE I—*continued.*

Date	No. of expt.	Source of virus	Incubation, in days	Duration, in days[1]	Remarks
		Goat.			
Feb. 12 ..	1887	Rats 1832 and 1838..	—	—	Never showed trypanosomes.
,, 12 ..	1888	,, 1832 ,, 1838..	—	—	,, ,, ,,
,, 12 ..	1889	,, 1832 ,, 1838..	15	109	Died of *T. brucei.*
,, 12 ..	1891	,, 1832 ,, 1838..	—	—	Never showed trypanosomes.
Mar. 15 ..	1890	Guinea-pigs 1840 and 1843	12	45	Died of *T. brucei.*
July 16 ..	2290	Dog 2254	26	39	,, ,,
,, 16 ..	2291	,, 2254	36	116	,, ,,
		Average	22·2	77·2	
		Monkey.			
Feb. 3 ..	1833	Rabbit 1830	7	8	Died of *T. brucei.*
,, 3 ..	1834	,, 1830	7	15	,, ,,
,, 3 ..	1835	,, 1830	7	14	,, ,,
,, 3 ..	1836	,, 1830	7	49	,, ,,
,, 3 ..	1837	,, 1830	7	16	,, ,,
,, 17 ..	1970	Laboratory-bred flies	—	17	,, ,,
July 16 ..	2292	Dog 2254	5	50	,, ,,
,, 16 ..	2293	,, 2254	5	65	,, ,,
		Average	6·4	29·2	
		Dog.			
Feb. 14 ..	1904	Monkey 1835 ..	6	26	Died of *T. brucei.*
,, 14 ..	1905	,, 1835 ..	6	17	,, ,,
,, 14 ..	1906	,, 1835 ..	10	18	,, ,,
,, 14 ..	1907	,, 1835 ..	6	23	,, ,,
,, 14 ..	1908	,, 1835 ..	6	21	,, ,,
April 1 ..	2047	Rat 2027	6	15	,, ,,
,, 1 ..	2048	,, 2027	6	20	,, ,,
,, 1 ..	2049	,, 2027	6	14	,, ,,
,, 1 ..	2050	,, 2027	6	17	,, ,,
,, 1 ..	2051	,, 2027	6	20	,, ,,
,, 22 ..	2104	,, 2065	6	17	,, ,,
June 24 ..	2240	Guinea-pig 2225 ..	7	12	,, ,,
July 3 ..	2254	Laboratory-bred flies	?	17	,, ,,
,, 9 ..	2281	Guinea-pig 2225 ..	5	20	,, ,,
,, 16 ..	2294	Dog 2254	5	19	,, ,,
,, 16 ..	2295	,, 2254	5	22	,, ,,
Aug. 11 ..	2361	Wild flies	?	16	,, ,,
		Average	6·1	18·5	
		Rabbit.			
—	145	Dog 1	—	33	Shilston.
—	146	,, 1	—	39	,,
—	150	,, 2	—	31	,,
—	157	Rat 4A	13	34	,,
—	158	Horse 37	3	27	,,
—	165	Rabbit 158	5	27	,,
Jan. 13 ..	1897	Pretoria strain ..	?	36	Died of *T. brucei.*
,, 17 ..	1830	,, ,, ..	?	35	,, ,,
		Average	7·0	32·7	

[1] Duration includes the days of incubation; it dates from day of infection.

TABLE I—*continued.*

Date	No. of expt.	Source of virus	Incubation, in days	Duration, in days[1]	Remarks
		Guinea-pig.			
Feb. 3 ..	1840	Rabbit 1830	31	50	Died of *T. brucei.*
,, 3 ..	1841	,, 1830	35	50	,, ,,
,, 3 ..	1842	,, 1830	—	—	Never showed trypanosomes.
,, 3 ..	1843	,, 1830	21	59	Died of *T. brucei.*
,, 3 ..	1844	,, 1830	14	37	,, ,,
,, 13 ..	1895	Pretoria strain ..	—	—	Never showed trypanosomes.
,, 13 ..	1896	,, ,, ..	—	—	,, ,, ,,
Mar. 28 ..	1842	Monkey 1970 ..	10	27	Reinjected; died of *T. brucei.*
,, 28 ..	1895	,, 1970 ..	20	46	,, ,, ,,
,, 28 ..	1896	,, 1970 ..	20	30	,, ,, ,,
May 13 ..	2136	,, 1970 ..	—	—	Never showed trypanosomes.
,, 29 ..	2136	,, 1970 ..	4	15	Reinjected; died of *T. brucei.*
June 13 ..	2225	,, 1970 ..	3	34	Died of *T. brucei.*
July 16 ..	2296	Dog 2254	47	89	,, ,,
		Average	20·5	43·7	
		Rat.			
Feb. 2 ..	1828	Rabbit 1830	8	19	Died of *T. brucei.*
,, 2 ..	1829	,, 1830	6	58	,, ,,
,, 3 ..	1832	,, 1830	7	46	,, ,,
,, 3 ..	1838	,, 1830	10	13	,, ,,
,, 3 ..	1839	,, 1830	7	22	,, ,,
,, 14 ..	1902	,, 1897	17	31	,, ,,
,, 26 ..	1966	Guinea-pig 1844 ..	8	23	,, ,,
Mar. 15 ..	1993	Rat 1832	5	13	,, ,,
,, 15 ..	1994	,, 1832	5	10	,, ,,
,, 15 ..	1995	,, 1832	5	30	,, ,,
,, 19 ..	2006	Monkey 1970 ..	5	24	,, ,,
April 4 ..	2065	,, 1836 ..	7	30	,, ,,
,, 11 ..	2073	Rat 2065	4	17	,, ,,
May 13 ..	2135	Monkey 1970 ..	6	33	,, ,,
,, 13 ..	2137	Goat 1889	6	18	,, ,,
,, 13 ..	2138	,, 1889	6	17	,, ,,
,, 29 ..	2196	Rat 2135	11	26	,, ,,
July 16 ..	2288	Dog 2254	5	33	,, ,,
,, 16 ..	2289	,, 2254	5	44	,, ,,
Sept. 2 ..	2406	,, 2361	6	24	,, ,,
,, 16 ..	2412	Rat 2406	6	34	,, ,,
Oct. 20 ..	2423	,, 2412	8	39	,, ,,
Nov. 28 ..	2442	,, 2431 . ..	4	16	,, ,
		Average	6·8	27·0	

Disease set up in Various Animals by T. brucei, *Zululand Strain*, 1913.

Horse.—The Commission had no opportunity of studying this strain in the horse, but Mr. Shilston states that one horse inoculated by him at Pietermaritzburg died in 35 days with typical symptoms of Nagana.

[1] Duration includes the days of incubation; it dates from day of infection.

Ox.—Six oxen were inoculated, but only two of these at any time showed trypanosomes in their blood. One of these died after 310 days, while the other is still alive at the end of a year. This animal has evidently recovered, as it appears sleek and healthy. The action of the Zululand strain is therefore the same as that of the trypanosome causing disease in man in Nyasaland; neither of them show any marked power of producing serious disease in cattle.

Goat.—Seven goats were inoculated with this strain. Four died, on an average, in 77·2 days (45 to 116). The remaining three proved refractory. No œdema of face or corneal opacity was noted in any of the goats. The Zululand strain seems to have less action on goats than the Nyasaland trypanosome, but the number of experiments is small. In the latter the duration of the disease was 41·8 days (19 to 72).

Sheep.—No experiments were made with these animals in Nyasaland, as it was found impossible to procure them from the natives.

Monkey.—Eight monkeys died, on an average, in 29·2 days (8 to 65). The trypanosomes were always present in the blood, sometimes in enormous numbers. In no case was œdema of the face or corneal opacity noted. After death enlargement of the spleen and liver, gelatinous infiltration at the base of the heart, and hæmorrhages in the epicardium were found.

Dog.—Seventeen dogs were inoculated. All died, on an average, in 18·5 days (12 to 26). In eight dogs blindness caused by opacity of the cornea was a prominent symptom, and in two swellings of the limbs were observed.

Rabbit.—As only two rabbits were available at Kasu, six experiments reported by Mr. Shilston are added. Eight rabbits died, on an average, in 32·7 days (27 to 39). The course of the disease in the Kasu rabbits was the same as that described in a former paper[1] as being typical of Nagana.

Guinea-pig.—This animal is less affected by the disease than the rabbit. Ten were used; all took the disease and died, but four required to be inoculated more than once. They died, on an average, in 43·7 days (15 to 89). No prominent symptoms, such as are seen in the rabbit, occur in the guinea-pig.

Rat.—Twenty-three were inoculated and died, on an average, in 27 days (10 to 58), with their blood swarming with trypanosomes and their spleens enormously enlarged.

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[1] "The Trypanosome causing Disease in Man in Nyasaland.—Susceptibility of Animals to the Human Strain," *Roy. Soc. Proc.*, B, vol. lxxxvii (1913).

TABLE II.—The Average Duration, in Days, of the Disease in Various Animals caused by *T. brucei*, Zululand Strain, 1913.

	Horse	Ox	Goat	Monkey	Dog	Rabbit	Guinea-pig	White rat
Average duration, in days	38	310	77	29	18	33	44	27
Number of animals employed	3	1	7	8	17	8	10	23

Compare this with the following table:—

TABLE III.—The Average Duration of Life, in Days, of Various Animals Infected with the Human Strain of the Trypanosome causing Disease in Man in Nyasaland.

	Horse	Ox	Goat and sheep	Monkey	Dog	Rabbit	Guinea-pig	White rat
Average duration, in days	0	134	42	26	34	28	67	30
Number of animals employed	0	1	29	20	25	7	15	21

TABLE IV.—The Percentages of Recoveries in Various Animals infected with *T. brucei*, Zululand Strain, 1913.

	Horse	Ox	Goat	Monkey	Dog	Rabbit	Guinea-pig	White rat
Percentages ..	0	83	0	0	0	0	0	0
Number of animals employed	3	6	4	8	17	8	10	23

Compare this with the following table:—

TABLE V.—The Percentages of Recoveries in Various Animals infected with the Trypanosome causing Disease in Man in Nyasaland.

	Horse	Ox	Goat and sheep	Monkey	Dog	Rabbit	Guinea-pig	White rat
Percentages ..	0	80	0	0	0	0	0	0
Number of animals employed	0	5	29	20	25	7	15	21

Conclusion.

The pathogenic action of *T. brucei*, Zululand strain, 1913, on various animals is so similar, not only in regard to the symptoms during life but also in the post-mortem appearances and rate of mortality, to that of the trypanosome causing disease in man in Nyasaland, that it affords another proof that these two trypanosomes are identical.

GOD'S ACRE IN NORTH-WEST INDIA.

By Colonel R. H. FIRTH.

(*Continued from p.* 333.)

Ferozpur.

This cantonment is rich in memorials of the glorious dead. In fact, the church "Was erected to the glory of God in memory of those who fell fighting for their country in this district during the Sutlej Campaign of 1845-1846," and contains many tablets of interest. In the old civil cemetery are graves of the following who especially interest us:—

Assistant-Surgeon Robert Beresford Gahan entered the service on June 17, 1836, and was sent at once to Mauritius. He returned home in 1840, and soon after was posted to the 9th Foot, then in India. Coming out he was unable to join his regiment as it was in Afghanistan, but did general duty in Cawnpur and Meerut, ultimately joining it at Sabathu in February, 1843. Towards the end of September, 1845, he was transferred to the 31st Foot, which he joined at Amballa and accompanied them into the field. He was mortally wounded at the battle of Mudki, whilst gallantly doing his professional duties under fire, and died eleven days later in Ferozpur, on December 29, 1845. His name is to be found also on a special monument to the 31st Foot in the cemetery, and on a memorial tablet in St. Andrew's Church.

Lieutenant Augustus Satchwell Johnstone was the son of Surgeon James Johnstone, of the Bengal Medical Service. He entered the Bengal Army in 1846, and having distinguished himself at Addiscombe, was at once employed upon survey work. Later he was in charge of the Ganges Canal, and in 1853 became executive engineer of the Sirhind division. Whilst so employed he died at Ferozpur on December 23 of that year. He married Louisa Caroline, daughter of Henry Benjamin Brownlow, of the Civil Service, and niece of the first Baron Lurgan. At the time of his death Johnstone was but 25 years old.

Surgeon George Grant was born at Inverness in 1812, and entered the Medical Department of the Bengal Army in 1840. His early years of service were spent mainly with the 5th Battalion of Foot Artillery at Nasirabad. In 1845 he was given medical charge of the 22nd N.I. and served with them at Fatehgarh and through the Punjab Campaign of 1848-9. At the end of the war

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that I have omitted to mention that, in the civil cemetery there is the grave of Anne Sarah, the beloved wife of Lieutenant-Colonel R. Napier; she died December 30, 1849. This grave interests one, as the lady was the daughter of Surgeon George Pearse, of the Madras Army, and first wife of the man who afterwards became Lord Napier of Magdala. They were married on September 3, 1840.

JALOZAI.

Near the village of this name, some twenty miles from Peshawar, and not far from the foot of the hills on which Chirat stands, there are two brick obelisks. One is to the memory of Lieutenant-Colonel William Donald Macdonald, who died of cholera when commanding the 93rd Sutherland Highlanders in camp at Jalozai on October 29, 1862, aged 35. The other obelisk is to the memory of Major W. G. A. Middleton, Ensign J. St. C. Drysdale, Assistant-Surgeon S. Hope, 61 rank and file, 13 women, 15 children, all of the 93rd Highlanders, who died of cholera at or near the spot during the month of October, 1862. There is reason to think that the existing inscriptions on these obelisks are not the original ones, they having been pilfered. The present inscriptions were placed on the monuments in 1906, the wording of the originals having fortunately been preserved in photographs in the possession of Macdonald's family. Captain Burgoyne, in his history of the 93rd, records that Middleton died on October 21 at the village of Urmur, near by, and was buried there; while Drysdale and Hope died two days later when marching to the camp at Jalozai.

Assistant-Surgeon Samuel Hope entered the service on March 19, 1861, as a staff-assistant-surgeon. In January, 1862, he was posted to the 93rd Foot, whom he joined at Peshawar. He was with the regiment when the terrible outbreak of cholera occurred in the autumn of that year, and, as stated above, he fell a victim himself to the infection.

JHELUM.

I can find but one grave here which is of special interest to us. It is that of Assistant-Surgeon Edgar William Mayne, who was an assistant-surgeon in the 37th N.I., and died here on August 2, 1851, aged 29. The tomb was erected by his brother officers. He joined the Medical Department of the Bengal Army in 1850, and reached India in the July of that year. He was sent up country with detachments from Dum-Dum to Wazirabad, and thence on to

the regiment went to Rawul Pindi, and afterwards to Ferozpur. As the regiment was ordered to Delhi in 1854, Grant exchanged to the 57th N.I., who were remaining at Ferozpur. He died there on April 19, 1855.

Among the names recorded on tablets in the church at Ferozpur, the following call for notice :—

Assistant-Surgeon Alexander Graydon entered the service on May 15, 1835, when he was posted to the 50th Foot, and joined them in New South Wales in 1836. In 1841 he was sent with the 26th Foot to China, but rejoined the 50th at Chinsura, in India. Continuing to serve with them at Cawnpur and Ludhiana, he accompanied the regiment into the field with the army of the Sutlej, but was killed at the battle of Mudki on December 18, 1845. His name is on the Mudki tablet in the church, but his body was buried with many others on the battlefield. Truly, of Gahan and Graydon at Mudki, and of Moore at Delhi, we may say here "Dulce et decorum est pro patria mori."

Lieutenant Francis Sievwright was the son of Assistant-Surgeon Sievwright, of the 59th Foot, and for many years the staff surgeon at the Mauritius. Young Sievwright joined the 9th Foot as Ensign at Chatham on December 3, 1841. In the following year he came to India with his regiment, and served at Sabathu and Amballa. On the outbreak of the Sikh War he accompanied the regiment into the field, and was present at the battles of Mudki and Firozshahr; in the latter action he was severely wounded, and died a few days later on January 3, 1846. I have not been able to find his grave. His name is on the Firozshahr tablet in the church at Ferozpur.

Lieutenant Norman Alexander Macdonald is commemorated on a tablet in the same church. He was the son of Surgeon James Macdonald, of the Madras Medical Service, and born December 29, 1867. He joined the Warwickshire Regiment in 1888 at Multan. Two years later he went into the Indian Army, and was posted to the 15th Sikhs, with whom he saw active service on the Samana. Subsequently he went to the 14th Sikhs and served at Peshawar and Dera Ismail Khan until the spring of 1897, when he proceeded to British East Africa to join an expedition under the command of his brother, now Major-General Sir J. R. L. Macdonald. The expedition was soon in difficulties owing to mutinies. Whilst holding out in Fort Labwa in Usoga, he was killed on December 10, 1897.

Before closing these notes concerning Ferozpur, I ought to say

that I have omitted to mention that, in the civil cemetery there is the grave of Anne Sarah, the beloved wife of Lieutenant-Colonel R. Napier; she died December 30, 1849. This grave interests one, as the lady was the daughter of Surgeon George Pearse, of the Madras Army, and first wife of the man who afterwards became Lord Napier of Magdala. They were married on September 3, 1840.

Jalozai.

Near the village of this name, some twenty miles from Peshawar, and not far from the foot of the hills on which Chirat stands, there are two brick obelisks. One is to the memory of Lieutenant-Colonel William Donald Macdonald, who died of cholera when commanding the 93rd Sutherland Highlanders in camp at Jalozai on October 29, 1862, aged 35. The other obelisk is to the memory of Major W. G. A. Middleton, Ensign J. St. C. Drysdale, Assistant-Surgeon S. Hope, 61 rank and file, 13 women, 15 children, all of the 93rd Highlanders, who died of cholera at or near the spot during the month of October, 1862. There is reason to think that the existing inscriptions on these obelisks are not the original ones, they having been pilfered. The present inscriptions were placed on the monuments in 1906, the wording of the originals having fortunately been preserved in photographs in the possession of Macdonald's family. Captain Burgoyne, in his history of the 93rd, records that Middleton died on October 21 at the village of Urmur, near by, and was buried there; while Drysdale and Hope died two days later when marching to the camp at Jalozai.

Assistant-Surgeon Samuel Hope entered the service on March 19, 1861, as a staff-assistant-surgeon. In January, 1862, he was posted to the 93rd Foot, whom he joined at Peshawar. He was with the regiment when the terrible outbreak of cholera occurred in the autumn of that year, and, as stated above, he fell a victim himself to the infection.

Jhelum.

I can find but one grave here which is of special interest to us. It is that of Assistant-Surgeon Edgar William Mayne, who was an assistant-surgeon in the 37th N.I., and died here on August 2, 1851, aged 29. The tomb was erected by his brother officers. He joined the Medical Department of the Bengal Army in 1850, and reached India in the July of that year. He was sent up country with detachments from Dum-Dum to Wazirabad, and thence on to

Rawul Pindi. He seems to have reached that place in July of 1851, and been immediately sent to the 37th N.I. at Jhelum. Within less than a month he died there of heatstroke.

Jullundur.

This place is curiously devoid of graves or memorials falling within the scope of this article. The only one calling for reference is in the old artillery cemetery, and bears the following inscription: "Sacred to the memory of George Alexander Tytler, late Captain of H.M.'s 53rd Foot and Assistant Commissioner in the Punjab. He departed this life at Jullundur on the 8th of March 1851, in the 37th year of his age. Publickly his loss has been great to the Government. He was ever zealous and active in the discharge of his duties. Most truly upright and conscientious, emulating the bright example of his father, the celebrated Dr. Robert Tytler, of the Bengal Medical Establishment." Two other sons of the same Dr. Tytler are buried respectively at Kohat and Simla.

Karnal.

This was once an important frontier cantonment. It acquired an unenviable notoriety for unhealthiness and was abandoned in 1842 for Amballa, to which place its garrison was moved. The graves or memorial tablets of the following attract our attention:—

Surgeon Oswald Hunter lies buried in the old cemetery. He entered the Bengal Army as an assistant-surgeon in July, 1805. Arriving in India in the following March, he was put in charge of the cadet company at Barasat, near Calcutta, and stayed there till the Barasat institution was abolished in 1811. He was soon appointed garrison surgeon at Buxar and held that appointment till December, 1818, when he was promoted surgeon and posted to the 6th Light Cavalry. He joined them at Karnal and died there on January 14, 1820.

In the tower of St. James's Church are a number of mural tablets, but none call for notice. However, the old church register indicates that a certain number of persons lie buried in the old cemetery or near by, of whom no monument remains. Among the names I noticed those of the following:—

Surgeon Andrew Stratton arrived in India, as an assistant-surgeon in the Medical Department of the Bengal Army, in November, 1813. He was quickly posted to the 8th N.I., joined them at Benares and proceeded with them on the Gurkha Campaign of 1814-15. After that he went to the 16th N.I. and

served with them at different places till 1825 when, on promotion to surgeon, he was posted to the 2nd European Regiment. A year later he was transferred to the 2nd Light Cavalry, whom he joined at Muttra and subsequently accompanied to Karnal. He died at that station on September 27, 1829.

Assistant-Surgeon James Hay Rothney joined the Bengal Army as an assistant-surgeon on September 4, 1839. The first two years of his service were spent with the 3rd N.I, mainly at Meerut. At the end of 1842 the battalion was disbanded, and he was ordered to Karnal as garrison surgeon with temporary medical charge of the 63rd N.I. He died there on March 3, 1843.

Kohat.

In the cemetery of this pretty frontier station I have come across the graves of the following:—

Apothecary Michael Healy, when proceeding to join the 1st Punjab Infantry, was attacked by a gang of Gallai Afridis on March 22, 1850, and cut down near the village of Togh, within six miles of his destination. He died next day, and his grave has the following inscription upon it: "Here rest the remains of Michael Healy, apothecary in the honourable Company's service, destroyed by the Afridis, 23rd March, 1850. Michael Healy was an Irishman, highly gifted with talents, energy and ambition; foiled in his aim and weary of his struggle with the world, he ardently sought that repose which he has here found."

Assistant-Surgeon John Edwin Cathcart was the youngest son of Elias Cathcart, of Auchendrane, in the county of Ayr; born in 1829 he entered the Medical Service of the Bengal Army in 1850. He was early appointed to the charge of the foot artillery at Lahore and remained there till the end of 1853, when he was posted to the 4th Punjab Cavalry, whom he joined at Kohat in the January of 1854, but died there on April 1 following of typhus fever, according to the inscription on the grave, which was erected by the officers at Kohat.

Assistant - Surgeon Benjamin Knowles joined the Bengal Medical Department on March 31, 1865, and was at once sent to the 13th N.I. at Peshawar. He remained with that regiment but a short time as he was sent to the 6th Punjab Infantry at Kohat in March, 1866. He died there on June 29 following. There is a memorial tablet to him in St. Augustine's Church at Kohat, but it gives his Christian name incorrectly.

Colonel John Adam Tytler was the son of Surgeon John

Tytler, of the Bengal Medical Service. Born in 1825, he entered the Bengal Army in 1845, and joined the 66th N.I. at Dinapur. In February, 1850, the regiment was disbanded at Amritsar and reconstituted as the Nasiri Battalion of Gurkhas or 66th Native Infantry. With them Tytler saw much service, both on the frontier and in the Rohilkhand area during the mutiny. For gallantry at Charpura in February, 1858, he was awarded the V.C. After this Tytler was employed on the staff, but in 1863 was given command of the 4th Gurkhas and served with them in the Ambeyla Campaign in that year and in Hazara in 1868. In the expedition to Afghanistan in 1879 he commanded the second infantry brigade and afterwards commanded the troops left in occupation of the Khyber. Later on he commanded the third brigade operating up the Kurram, but, contracting pneumonia, died at Thal on February 14, 1880.

In the church at Kohat are memorial tablets to Assistant-Surgeon Knowles, referred to already; also to a Surgeon MacIver whose grave is at Sialkot, and whose career will be mentioned under that place; also one to the writer's uncle, Captain M. R. Somerville, mentioned under Dera Ghazi Khan.

Lahore.

I have been able to find but one grave here of special interest to us; it is that of the following medical officer :—

Senior Surgeon James Barber was born at Thorney, in Cambridgeshire, in 1802. As a surgeon he came out to India on his own account and got employed as an assistant-surgeon on the Bengal establishment in 1825. He was soon put in medical charge of the horse artillery at Bharatpur and was present with them at the siege of that place. In 1827 he was regularly appointed to the Bengal Medical Department by the Court of Directors and posted to the 7th N.I. at Mirzapur. Shortly after this he seems to have gone home on furlough, but returned in 1831 when he was made garrison surgeon of Chunar. In 1839 we find him with the 40th N.I. at Dinapur, but on being promoted to be full surgeon in 1845 he was posted to the 51st N.I. at Meerut. With that corps he served through the Sutlej Campaign, and at the conclusion of the war was transferred to the 12th N.I. at Multan. In 1857 he was further promoted to be superintending surgeon of the Sialkot circle, and in the following year transferred to the Lahore circle. He died there on September 15, 1859, at the age of 57.

In the Cathedral are two memorial tablets which arrest our

attention. One is to the memory of Surgeon Lieutenant-Colonel H. J. Linton, who died at Peshawar and whose career will be noted under the heading of that place; the other is to the memory of Charlotte Maria Tucker, well known in the Christian world by her writings as A.L.O.E. She was a lady who devoted herself to zenana mission work and was well known to the writer when he was stationed at Amritsar in the 'eighties. She died December 2, 1893, aged 72.

Those buried or memorialized in the cantonment of Lahore are referred to under the head of Mian Mir.

LUDHIANA.

This former important frontier post contains the graves of a few who deserve a place in this article.

Surgeon John Balfour entered the Medical Department of the Bengal Army in 1796, and was at once made assistant-surgeon to the 7th N.I., whom he joined at Chunar and continued to serve with till November, 1808, when on promotion to full surgeon he went to the 5th Cavalry at Muttra. Two years later he was transferred to the 16th N.I. In January, 1815, he went as "field surgeon" to the division under the command of Colonel Ochterlony, then operating against the Gurkhas. After the end of the war he rejoined the 16th and for the next four years served with that regiment at Delhi, Rewari and Ludhiana; he died at the last mentioned place on May 20, 1819, in his 45th year. The tomb was "Erected by his friends in the corps as a tribute of their esteem and regret."

Captain George Rodney Blane was the second son of the well-known naval surgeon, Sir Gilbert Blane, Bart. Young Blane was born in 1791 and entered the Bengal Army in 1806 as a cadet of artillery or engineers. For many years he was employed on survey and harbour construction work. On the breaking out of the war with Nepal in 1814 he joined the field force and was severely wounded in the attack on the fort of Kalanga, near Dehra Dun. On the termination of the first phase of the war he went to Ludhiana as garrison engineer. Later he was made superintendent of canals in the same district, and died at Ludhiana on May 18, 1821.

Surgeon James Frederick Steuart joined the Medical Department of the Bengal Army in 1821, but did not arrive in India till June, 1823. For the first two years he did duty at the Presidency Hospital, but in May, 1825, was posted to the 69th N.I. He does

not seem to have remained long with them, as he was successively with the 59th, 41st, 47th and 35th N.I. On promotion to the rank of surgeon he was re-posted to the 59th N.I., with whom he remained till October, 1844, when he was transferred to the 11th Light Cavalry. He stayed with that regiment until his death at Ludhiana on August 2, 1846. The legend on his tombstone shows his name misspelt as "Stewart."

MALAKAND.

There is but one grave here which calls for notice. It is that of Major John Lamb, the grandson of Assistant-Surgeon John Lamb, of the Bengal Medical Department, and many years the civil surgeon of Malda. The younger Lamb was born in 1854, and entered the service through the Hertford Militia in 1874. From them he passed into the 16th Foot and went to India. There he was first employed with the Merwara Battalion, but later on went to the 24th Punjabis, with whom he served through the later phase of the Afghan Campaign of 1879-80. In 1881 he was transferred to the 22nd Punjabis as adjutant and remained with that regiment until early in 1889, when he served on the staff in the Sikkim Expedition. After this he held a series of staff appointments until he was given the command of the 24th Punjabis in December, 1896. Joining them again at the Malakand, he commanded them during the fanatical outbreak of 1897, and was fatally wounded on July 27, and died on August 23, 1897. I knew Lamb well, and no finer soldier ever wore the King or Queen's uniform.

MARDAN.

This place is full of memorials of the illustrious dead. The Kabul Memorial is an outstanding feature and is in memory of the Guides who fell in the défence of the Residency at Kabul in 1879. On it are to be seen two names of medical interest, namely, those of 3rd Class Hospital Assistant Rahman Bakhsh and of Surgeon Ambrose Kelley. The name is so spelt on the memorial, but should be "Kelly."

Surgeon Ambrose Hamilton Kelly entered the Bengal Medical Department as assistant-surgeon in October, 1869, and for the first few years was moved about in a variety of officiating medical charges. In March, 1873, he was sent to Mardan to act for the surgeon of the Guides, ultimately getting the permanent appointment in June, 1876. With that corps he served through the Jowaki Expedition of 1877-8 and through the earlier phases of the Afghan Expedition.

of 1879. In July of that year he was appointed Surgeon to the Embassy at Kabul and accompanied Sir Louis Cavagnari to that place. He was killed with his chief and many others on September 3, 1879, when the Embassy was attacked by the mutinous Afghan soldiery.

In the cemetery here is a large grave containing the bodies of those who fell in action in the Ambeyla Pass between October 20 and December 23, 1863. Among the names inscribed is that of one medical officer.

Assistant-Surgeon William Pile entered His Majesty's service as a staff assistant-surgeon on March 31, 1862. He soon came out to India and joined the 101st Foot at Rawul Pindi. He served with that regiment through the expedition against the Yusafzais and in the Ambeyla Campaign. He was killed on November 20, 1863, whilst gallantly rallying some of the men of the regiment who had been driven, by overwhelming numbers of Pathans, from the position known as the Crag Picquet.

Mian Mir.

In this place, now known as Lahore Cantonment, one has found graves or memorials of the following :—

Surgeon Alexander Greig entered the Bengal Army in the Medical Department in 1838. After a short tour of duty at the Presidency Hospital, he joined the 2nd Regiment of the Oudh Auxiliary Force at Sitapur, and served with it in various places till July, 1851, when, on being promoted to the rank of surgeon, he was transferred to the 5th N.I. He joined them at Mian Mir and served with them till his death from heatstroke on July 27, 1852. The monument to his memory was erected by his brother officers in the regiment, as a token of esteem and regard. His grave and that of the following official is in the cemetery of the artillery lines.

Assistant Hospital Steward Alfred Fitzherbert Marshall, of the 3rd Light Cavalry, was the son of Apothecary Charles Marshall, of the Calcutta Lunatic Asylum. He served in the volunteer cavalry throughout the mutiny, being severely wounded at Lucknow when proceeding to the relief of that garrison with Havelock's force. He died at Mian Mir on August 6, 1859, aged 22.

In the British Infantry cemetery are the graves of the following :—

Assistant-Surgeon Alexander Grant entered His Majesty's service on March 9, 1855, and was appointed to the 70th Foot. He joined them at Ferozpur, but soon after was sent to do duty with the 81st Foot at Mian Mir, where he died on August 29, 1856.

Deputy Inspector-General William Holmes Jephson entered the service as an assistant-surgeon in the 61st Foot on July 12, 1844. He joined them at Cork and soon embarked with the regiment for India, where he served with it through the Punjab Campaign of 1848-9 and in operations against the Yusafzai frontiersmen. Going home in 1850, he was transferred to the 9th Lancers, whom he joined at Amballa at the end of 1851. Exchanging into the 96th Foot, he went home with that regiment in 1854. Promoted to staff surgeon in the following year, he went with the 1st Dragoon Guards to the Crimea, and remaining with them throughout that campaign returned home with the regiment, and later on embarked with it for India in July, 1857. He continued serving with the regiment, mainly in southern India, till it went home in 1866. On landing in England, he and the regiment went to Colchester, where he remained till the following year, when he was promoted to be deputy inspector-general and sent out to India. Posted to the administrative charge of the Lahore Circle, he died at Mian Mir on April 7, 1870.

Among the tablets in the church of St. Mary Magdalene one finds that to the memory of Helen Johnson Snell, daughter of the late Surgeon Samuel Davies, of the Company's service, who with her husband of the 64th N.I. and their only child fell victims to the Sepoy mutiny at Sitapur, on June 3, 1857. Another tablet, or rather monument, in the churchyard is to the memory of 67 men, 7 women, and 26 children of the 37th Foot, who died in various adjacent camps during the cholera epidemic between July 17 and August 25, 1872. Similar to that memorial is one out on the Chabil grass rakh in the vicinity of the cantonment, which marks the graves of 53 out of 68 rank and file of the 51st Foot, who died of cholera there between August 16 and September 17, 1861. During that epidemic the regiment lost 1 officer, 256 men, 16 women, and 16 children. They mostly lie in unmarked graves at Chabil, Ghoranda and Amar Sidhu, which are villages in the neighbourhood.

Multan.

Here I have been able to find but one grave of a medical officer. It is that of Surgeon Robert Richard Dowse, who joined the service in 1841 as an assistant-surgeon to the 1st West India Regiment, with which he served at Demerara. In 1842 he was transferred to the 16th Foot, but only remained with them a year as he was sent to Hong Kong as a staff assistant-surgeon. In April, 1851, he was

promoted surgeon and joined the 13th Foot, with whom he went to Gibraltar. At the end of 1853 he exchanged into the 30th Foot and served with that regiment through the Crimea, including the battles of the Alma and Inkerman. With them he returned to Gibraltar, at the end of the war, but soon exchanged home to the staff. On January 18, 1859, he was posted to the 70th Foot and, having landed at Karachi, when on his way to join the regiment, he died within a day's journey of Multan on February 14, 1859.

MURREE.

In the old cemetery here are two graves which interest us: those of Surgeon Elderton and of Hospital Sergeant Perolz.

Surgeon Charles Augustus Elderton entered the Medical Department of the Bengal Army in 1840. His first two years of service seem to have been spent in wandering over the country in charge of detachments. In January, 1843, he was given medical charge of the Kalat-i-Ghilzai Regiment, and served with that corps during the field operations which culminated in the battle of Maharajpur, at which he was present. After this campaign he was given the civil surgeoncy of Meerut, and continued in that position till February, 1854, when, getting promoted to the rank of surgeon, he was posted to the 15th N.I. and joined them at Peshawar. Soon after this his health broke down, and while on leave at Murree he died on October 3, 1854.

The grave of Perolz has upon it the following inscription: "Sacred to the Memory of Henry Perolz, hospital sergeant to H.M.'s first battalion of the 7th Royal Fusiliers, who departed this life on June 20, 1859, aged 29 years. This tomb is erected as a mark of esteem by the serjeants of the battalion."

In the new cemetery is the grave of the following officer, whom one knew and whose funeral one attended:—

Major George Schuyler Cardew, son of Deputy Inspector-General G. Cardew, of the Bengal Army, was born July 11, 1861, and entered the army as surgeon in the Medical Staff on January 30, 1886. He was promoted Major in the Royal Army Medical Corps twelve years later, and while doing duty at Murree during the summer of 1898 died there on August 17 of that year. He does not appear to have had any war service. Cardew married a Miss Elgee at Dover in 1896. She subsequently married Captain W. L. Osborne, of the Royal Sussex Regiment.

Among the tablets in the church at Murree is one to Colonel Samuel Hugh James Davies, who was the eldest son of Surgeon

Samuel Davies, of the Bengal Medical Establishment, and brother of the Mrs. Snell whose memorial tablet is in the church at Mian Mir. Young Davies was born in 1819, and entered the Bengal Army in 1836. He joined the 51st N.I. and served with it through the Gwalior Campaign, including the battle of Paniar. Later on he served with it through both the Sutlej and Punjab Campaigns, and did not leave the regiment till October, 1854, when he went into the Public Works Department. For many years he was employed on canal work, and while so engaged died at Shillong on June 22, 1869. The tablet to his memory in the church at Murree is due to the fact that the church was completed under his supervision.

NAHAN.

At this out of the way place in the hills are three graves. One is that of four officers of the 26th N.I. killed in the actions of Jampta and Jaithak on December 27, 1814, in the Gurkha War of that time. Another is the grave of Captain Vivian, of the Scottish Rifles, who died here on August 8, 1887, when out on a shooting tour. The third is that of a medical officer under whom I served many years ago at Amballa.

Brigade-Surgeon John Alexander Scott was born in Dublin on February 13, 1836, and entered the service as a staff assistant-surgeon on October 11, 1859. He was sent to India towards the end of 1860, and posted to the 70th Foot; with that regiment he went to New Zealand, and served through the Maori War of 1861-2. Returning to India in 1863, Scott was attached to the 91st Foot at Nagode; he served with them at various places and returned to England with the regiment in November, 1868. For two years he was employed as a staff assistant-surgeon in Ireland, but in 1871 was sent out again to India, where he was given charge of the Divisional Staff at Amballa. In 1873 he was promoted surgeon with the local rank of surgeon-major, and sent to the 12th Foot then at Ferozpur. Two years later he was posted to the 15th Hussars at Meerut, and subsequently had charge of the convalescent depot at Landour. In 1881 he was ordered to South Africa, and served through the Boer War, getting back to England in 1882. Only at home a year he was ordered out to India again, where he was put in charge of the station hospital at Nowshera and remained there till 1885, when he was transferred to a similar charge at Amballa, and promoted to the rank of brigade-surgeon. In 1886 he was made an honorary surgeon to the Viceroy. He continued at Amballa till October, 1888, when he was ordered home

and posted to Aldershot. There he served until his retirement on August 20, 1890. He returned to India subsequently, having obtained some employment under the Raja of Nahan. He died at Nahan on February 4, 1900. We all liked Scott, and he was to us a typical representative of the older type of army medical officer. May he rest in peace.

Nowshera.

Here one finds the grave of but one medical officer, and that a very recent one. It is that of Major Frank Dennis Browne, who was born on October 26, 1869, and entered the Indian Medical Service on July 29, 1896. His first two years of service were passed with the 32nd Madras Infantry, now the 92nd Punjabis; he was next sent to Burma with the 14th Madras Infantry, and later on returned to India, and was at Cannanore with the old 19th Madras Infantry, now the 79th Carnatics. He remained officiating with them till he went to civil and was employed in the jail department, being given charge of the Jubbulpur Jail on April 28, 1905. Two years later he took six months' leave home and on his return was placed in charge of the jail and convict establishment at Port Blair. In July, 1909, he reverted to military duty and was appointed to the 112th Infantry, with whom he served at Multan and Bannu. He took a year's leave home early in 1912, and went with his regiment to Nowshera early in 1913. Contracting pneumonia, he died there on February 19, 1913.

Nurpur.

At this little visited spot in the Kangra Valley is the grave of one Agha Jan, alias John Harlan. He really was the son of Rastam Khan Kurji, but the adopted son of Josiah Harlan, around whom our present interest centres. This person was the son of a Quaker of Philadelphia, and was brought up to the medical profession. As a stowaway he found himself at Calcutta in 1824. There being a shortage of medical men at the time, he applied for and obtained the appointment of an acting assistant-surgeon on the Bengal establishment of the Company. He was soon sent to Rangoon and attached for duty there at the Artillery Hospital. Returning to India in the next year he was posted to the 39th N.I., at Lucknow, but in 1827, on reduction of the establishment, he was discharged from the Company's service. Harlan then wandered across the Sutlej and took service with Ranjit Singh, by whom he was employed as a secret agent in Afghanistan. There he soon

won favour with Dost Mahomed, and later on Harlan returned to the Punjab as a secret agent of the Amir. In spite of this double dealing, Ranjit Singh made him Governor of Nurpur and Gujerat; but in 1835 he was removed from that post and sent back to Kabul ostensibly as an ambassador, but really to create disloyalty among the Amir's chiefs and nobles. Within a year he took service openly with the Amir Dost Mahomed, and soon succeeded in bringing about a war between his present and former masters. In 1840 a British force advanced into Afghanistan under Sir John Keane, and Harlan was sent to negotiate with the invaders; these negotiations being a failure, the Amir retired to Kohistan and Harlan found his way back to India. In 1842 he reached England and subsequently published a "Memoir of India and Afghanistan." One would like to read that book, as it should contain some interesting information. What subsequently became of Harlan, and when and where he died, I have been unable to find out. Doubtless a knave, he is an interesting personality and very typical of a class of European who, since the days of Akbar, have often crossed India's stage and played big, if ignoble, parts in her history. Harlan's adopted son, whose grave has prompted these bits of history, was killed in a brawl for the favours of a lady.

Peshawar.

The oldest cemetery here is that outside the north-east gate of the city. It contains several tombs, but all inscriptions have gone. From a search in certain old records I have found out that one inscription on a tomb was to the memory of eight officers of the 61st Foot who died at Peshawar during the stay of that regiment in the station. Among the names is that of the following medical officer:—

Assistant-Surgeon Davis Lucas was born in 1816, and entered the service on December 20, 1839. For two years he did duty at Fort Pitt, Chatham, but in August, 1841, exchanged into the 68th Foot and joined them in Canada. He went home with the regiment in 1844, and was soon transferred to the 61st Foot and embarked with them for India in the following year. He served with the regiment at Cawnpur and Jullundur, then through the Punjab Campaign of 1848-9, including the passage of the Chenab, the battles of Sadulapur, Chilianwala and Gujerat. On conclusion of the war the 61st were quartered at Peshawar, and at that place Lucas died on October 25, 1850.

Among some graves in the old Sadr Bazar cemetery I came

across that of Apothecary Richard Bean. He was admitted into the subordinate branch of the Bengal Medical Department as a hospital apprentice on January 15, 1829, when twelve years old. Serving eight years in the hospital at Cawnpur, he was attached to the 16th Lancers, but in 1842 was sent to Afghanistan with the third troop of the second brigade of horse artillery. At Jalalabad he was made hospital steward of the 13th Foot, and remained with them till their return to India, when he was sent to the 40th Foot and was present at the battle of Maharajpur. When the 40th Foot went home in 1845 Bean was attached to the camp of the Governor-General, and was with His Excellency's camp throughout the Sutlej Campaign, including the battles of Mudki, Firozshahr and Sobraon. After the war he did duty with the 21st Foot until they went home in 1848. Soon after this Bean was transferred to the Foreign Department, and made medical officer of the 1st Punjab Infantry then at Peshawar. He died there on October 5, 1849. As one records this old fellow's career, one cannot but feel that he represented a fine type and fittingly deserves a place in this roll of honour.

Among the graves in the cemetery on the Jamrud Road is that of the following officer who, remotely, claims our interest as the descendant of a man who was doctor, warrior and administrator. The grave is that of Major Henry Holwell Birch, a great grandson of John Zephaniah Holwell, a survivor of the Black Hole tragedy, sometime a doctor and sometime Governor of Bengal. Birch was born in 1837 and was with his father, then commanding the 41st N.I., when that officer was killed by mutineers at Sitapur on June 1, 1857. Young Birch escaped to Lucknow and served as a volunteer in the defence of the Residency there. After the mutiny, in consideration of his services and history, he was given a commission in the 27th N.I. In 1860 he was transferred to the 19th Punjab Infantry and went with them to China. A few years later the regiment was renumbered as the 27th Punjabis, and Birch still continued to serve with them, seeing much service on the frontier and ultimately getting the officiating command of the regiment. In that capacity he was killed in the assault of Ali Musjid on November 21, 1878.

In the Taikal cemetery the following officers' graves attract notice:—

Lieutenant Eric Henry Ernest Green was the fourth son of the Rev. Alfred John Morgan Green, and was born at St. David's in Pembrokeshire on March 5, 1871. He was the brother of Major

S. F. St. D. Green, now an officer in the Royal Army Medical Corps, and entered the Royal Engineers on July 25, 1890. After two years' service at Chatham he came out to India and for some years did duty with the 1st Company of Sappers and Miners, seeing active service in the Tochi Valley and in the Khyber. When with this company at Peshawar he was assassinated by a Pathan fanatic at Shabkadr on March 25, 1900.

In this cemetery is buried Gertrude Harcourt Coville Tincler, the wife of Surgeon B. M. Tincler (afterwards Blennerhasset), of the Army Medical Department. She was the daughter of Captain Wilcox, R.N., and died on April 10, 1878, aged 25, under very tragic circumstances. The death register gives the age as stated, but the inscription on the headstone of the grave gives her age as 36.

Austin Herbert Gunter, a relative, I believe, of Major F. E. Gunter, now an officer of the Royal Army Medical Corps, entered the Punjab Commission in 1891. During 1897 he served as assistant political officer with the Malakand Field Force, and subsequently was deputy commissioner at Bannu, and then district judge at Peshawar. With Green, he was killed at Shabkadr by a fanatic on March 25, 1900.

Surgeon-Lieutenant-Colonel Henry James Linton was born January 18, 1844, and entered the Indian Medical Service in April, 1869, as an assistant-surgeon. For some time he did duty with the 40th N.I., but in February, 1873, was given the permanent medical charge of the 24th Punjabis. With them he served through the Afghan Campaign of 1878-80, including the march from Kabul to Kandahar, and on the Hazara Expedition of 1888. Linton, excepting two absences on furlough, never left the 24th Punjabis, and when with them at Mian Mir in 1885 was well known to the writer, to whom he showed many kindly actions. In 1892 he was sent to take temporary charge of the 26th Punjabis at Peshawar, and died shortly afterwards at that place on April 4, 1892.

Major Frederick McDowell was born on May 1, 1865, and joined the Medical Staff as surgeon on July 28, 1891. He served in the Tochi Valley during the field operations of 1897-8, and went home in 1899. During the South African War he was in the Orange River Colony, including the actions of Biddulphberg and Wittebergen, and in 1901-2 was with the field army in the Transvaal. He came out to India for a tour of duty in 1906 and while stationed at Peshawar, died on August 6, 1908.

In St. John's Church, among the various tablets, there is one erected by the officers of the 94th Foot to the memory of four of their comrades who died in the Punjab during the years 1858-9. One of the four was the following:—

Surgeon Thomas Cowan entered the service as a staff assistant-surgeon on September 17, 1841, and was soon sent to the first battalion of the 60th Rifles. He came out to India with them in 1845, but went home on leave in 1848. In the following year he exchanged into the 17th Foot, and served at home with them until May 27, 1853, when he exchanged into the 52nd Foot and came out to India. Taking leave home in 1857, he exchanged into the 94th Foot and soon returned to India with that regiment. While with that corps he died at Rawul Pindi on November 7, 1858. He is buried there.

Rawul Pindi.

In the old cemetery here are the graves of Cowan, mentioned above, and of the following medical officer:—

Assistant-Surgeon Charles Forbes entered the Medical Department of the Bengal Army in 1841. Soon after arriving in India he was sent to do duty with the 50th Foot at Moulmein in Burma, but in 1843 was given charge of the jail at Panipat. He held that but a short time as he was sent to the foot artillery at Sukkur in Sind. There his health broke down and he went home. On his return in December, 1849, he was sent to the 65th N.I. at Lahore, but his health being indifferent he was transferred to the 66th (Gurkhas) N.I. With that regiment he went on field service during 1851-2, and ultimately found himself with them at Rawul Pindi early in 1854. He died there of tuberculosis on August 21, 1854.

In the new cemetery is the grave of Lieutenant-Colonel James Ring, who was born on March 5, 1850. He graduated at the Queen's University, Ireland, and was appointed surgeon in the Army Medical Department on September 30, 1873, being promoted surgeon-major in 1885, surgeon-lieutenant-colonel in 1893, and brigade-surgeon-lieutenant-colonel in January, 1897. He served in Malta, Cape of Good Hope, Bermuda, and the Punjab, and his war services included the Zulu and Transvaal Campaigns in the South African War of 1879-81. He was present at the battle of Laing's Nek, the action at the Ingogo, and the battle of Majuba Hill, and was mentioned in dispatches. He also served with the Malakand Field Force and the Tirah Expeditionary Force, and it was while serving with the latter in November, 1897, that he

contracted malaria, which ultimately caused his death. He was brought before a Medical Board in the autumn of 1898, and was at Rawul Pindi, on his way home, when he died quite suddenly in his bungalow from heart failure on October 16, 1898, at the comparatively early age of 48. He was married at Belfast in 1882 to the daughter of the late Surgeon-General Sinclair, and left two children, a son who is now a Captain in the 46th Punjabis, and a daughter.

In the new cemetery I also came across the grave of Colonel Hugh Bent, who interests us as having been the father of Major George Bent, at one time in the Royal Army Medical Corps. Colonel Bent joined the Royal Artillery in 1844, and served through the Crimean Campaign with the Bashi-Bazouks and Osmanli Artillery. Later on he came out to India, and while commanding the artillery at Pindi died there on October 28, 1875.

Only one of the memorial tablets in Christ Church arrests our notice. It is sacred to the memory of Lieutenant Richard Edward Frere, a brother of Sir Bartle Frere, and a connexion by marriage with the writer's mother. This Frere served in the 13th Foot and was in that regiment throughout the disastrous campaign in Afghanistan of 1839-42, in which he was wounded at the action of Tezin. As the result of hardships from four years' campaigning, he died on the march back, at Rawul Pindi, on November 18, 1842. His grave is still to be seen in the Rajah bazaar of that place.

Sabathu.

In the old cemetery here are the three graves of the following, all of them medical officers:—

Assistant-Surgeon Henry Cavell entered the Medical Department of the Bengal Army in 1820. For the first two years of his service he was garrison surgeon at Fort William, then he was appointed Deputy Apothecary to the East India Company, which meant that he was in charge of all the medical stores and generally responsible for the maintenance of a sufficiency in the country to meet the needs of the Company's service. In January, 1827, he was appointed surgeon to Lord Amherst, the Governor-General, and while on his way with him to Simla he died at Sabathu on June 21, 1827.

Surgeon James Gilbert Gerard was of the Gerards of Rochsoles in the county of Lanark, and son of the Professor of Divinity at Aberdeen. Born in 1793, he entered the Medical Department of the Bengal Army in 1813. On arrival in India he was sent at once

to join the field force under Colonel Ochterlony, then operating against the Gurkhas, above Rupar. On conclusion of the war when Gurkha corps were formed in our service, Gerard was appointed to medical charge of the Nasiri Battalion, now the 1st Gurkhas. He stayed with that corps till December, 1831, when he was permitted to go with Lieutenant (afterwards Sir Alexander) Burnes on an exploring mission to Kabul, Turkestan, Bokhara and Persia. Getting back to India in April, 1834, he rejoined the Nasiri Battalion at Sabathu, but died there on March 31, 1835.

Surgeon John Coulter entered the Bengal Army in the Medical Department in 1817. Almost at once appointed as civil surgeon of Burdwan, he held it without a break until 1830 when, on promotion to surgeon, he was posted to the horse artillery at Meerut. In April, 1835, he took leave to the Simla hills and died at Sabathu on May 25, 1835.

SIALKOT.

Near the fort there is an old cemetery and in it are the graves of the three following persons who, with others, were killed by mutineers on July 9, 1857. One grave is that of Hospital Serjeant Nulty; of him I can find no information, but of the others the following facts are available:—

Senior Surgeon James Graham joined the Medical Department of the Bengal Army as an assistant-surgeon on January 9, 1820. He first served with the Sappers and Miners at Cawnpur for two years; he then went to the 14th N.I. at Mhow. In 1824 he was made civil surgeon at Mehidpur, and remained there till promoted to surgeon in 1831, when he reverted to military duty and was posted to the 42nd N.I. at Neemuch. In May, 1835, he was put with the third brigade of horse artillery at Karnal. In 1843 he was placed as staff-surgeon with the headquarters of the field force operating against Gwalior, and was present at the battle of Paniar. After that war he went with his artillery brigade back to Cawnpur, and in 1845 accompanied them throughout the first Sikh War, being at the battles of Firozshahr and Sobraon. When the war was over he went with his corps to Meerut, taking furlough home in 1847. Returning in 1850, he joined the 16th N.I. at Benares; going home again in the next year he did not return to India till March, 1853, when he joined the 44th N.I. at Dinapur. Soon after this he was made a superintending or senior surgeon and given charge of the Sialkot circle. While there in 1857 the mutiny broke out on July 9, and while trying to get to the fort he was cut down by some troopers of the 9th Light Cavalry.

Assistant-Surgeon John Colin Graham was no relation to the above, but son of General Graham, of the Bengal Infantry, by Margaret, daughter of Senior Surgeon Adam Freer, and born November 24, 1819. He entered the Medical Department of the Bengal Army in 1844. His first two years of service were spent in wandering about in charge of reliefs. In August, 1846, he was posted to the 68th N.I. at Ferozpur, but in July, 1848, he was made medical storekeeper with the force besieging Multan. On conclusion of the Sikh War he became medical storekeeper at Ferozpur; this was in 1850. Three years later the stores were removed to Sialkot and Graham went there too; while holding the post of medical storekeeper at Sialkot the mutiny broke out, and while trying to reach the fort on July 9, 1857, he was cut down and killed.

The graves of the following are in the new or west cemetery:

Deputy Inspector-General William Stephens Dicken entered the Medical Department of the Bengal Army in 1828. He seems to have been ill for the first two years and went home in 1830. When he returned in 1833 he was made civil surgeon and salt agent at Balasore. He stayed there as such till September, 1846, when, on promotion to surgeon, he was sent to the 61st N.I. at Barrackpur. Staying with them but a little over a year, Dicken was made civil surgeon at Patna and also registrar of deeds. In that capacity he stopped till November, 1857, when he asked to go back to military employ, and accordingly was posted to the Gurkha troops lent by the Nepal Durbar to help us in putting down the mutiny, and with them took part in the siege and capture of Lucknow. In 1858 he was promoted to be senior surgeon, changed in 1860 to that of deputy inspector-general, and given administrative charge of the Sialkot circle. He died there on December 14, 1861. Dicken married at Plymouth, in 1833, Catherine, daughter of Captain Joseph Lamb Popham, R.N., and his eldest daughter married at Bankipur, on October 25, 1855, Lord Henry Ulick Browne, of the Civil Service, and became afterwards (1903) Marchioness of Sligo.

Assistant-Surgeon James Robertson MacIver was the eldest son of Evander MacIver, of Scowrie House, in Sutherlandshire, and entered the Medical Department of the Bengal Army on March 31, 1865. At once posted to the 4th Punjab Infantry, he served with them at Dera Ismail Khan and Kohat. He died at the latter place on December 11, 1869, but is buried at Sialkot. There is a memorial tablet to his memory in the church at Kohat.

Lieutenant-Colonel James Clarke entered the Indian Medical

Service as a surgeon on March 31, 1880, and was at once sent to the 3rd N.I. at Chaman. Moving with that regiment to Nowgong in 1882 he left them in the following year for the 12th N.I. at Kachar, and with that corps proceeded on the Akka Expedition of 1883-4. In 1885 he became resident surgeon in the General Hospital at Calcutta. After going home for two years in 1892-4, he acted for a time as professor of surgery at Lahore, and later as civil surgeon at Karnal, Dalhousie and Gurdaspur. He took leave home again in 1898 and on coming back in 1899 was made civil surgeon at Sialkot. There he died on February 15, 1901. His grave gives the date of his birth as October 31, 1854, but the official records give it as October 29, 1856.

SIMLA.

I can find no graves of medical interest in the old cemetery here. Graves of the following are in the new cemetery :—

Senior Surgeon Bannatyne William Macleod was born in 1794, and entered the Medical Department of the Bengal Army as assistant surgeon on September 29, 1815. For the first seven years of his service he was in medical charge of the Residency at Lucknow, then from 1823 to 1828 he did duty with the artillery at Dum-Dum, when he went home for nearly two years. Returning to India in 1830 he did two more years with the artillery at the same place. In 1832 he was posted to the 3rd Light Cavalry and was with them till the beginning of 1845, serving with them through the Afghan Campaign of 1838-9. In 1845 he was made superintending surgeon of the army of the Sutlej and was present at the battle of Sobraon. At the conclusion of the war he was given administrative charge of the Agra circle, and awarded the C.B. in 1850. Three years later he was transferred to the Sirhind circle and died while on leave at Simla, on October 3, 1856.

Senior Surgeon Edmund Tritton was born at Hythe, in Kent, in 1802, and entered the Medical Department of the Bengal Army in 1825. During the early years of service he had a succession of temporary charges, but in 1833 was made civil surgeon at Aligarh, where he remained for four years, until he went home ill in 1838. Returning in 1840 he was posted to the 71st N.I. and stayed with them till the end of 1846, when he was transferred to the 4th Battalion of foot artillery at Ferozpur, and with them went through the Punjab Campaign of 1848-9. After the war he became medical storekeeper at Amballa, and remained there till promoted a senior or superintending surgeon of that circle in 1857. On the formation

of the Delhi Field Force he was made its senior surgeon and served throughout the siege of that city, receiving for his services the C.B. After the mutiny he was made inspector-general of hospitals in the Punjab, and while holding that appointment died at Simla on June 15, 1858.

Deputy Inspector-General William Cruickshank entered the service on November 22, 1827, as a hospital assistant, and was promoted a staff assistant-surgeon on November 5, 1829. Posted then to the 79th Foot, he joined them in Canada and returned with them to England in 1836. On March 3, 1837, he was made assistant-surgeon to the 93rd Foot and went with them to Canada. On January 6, 1843, he was promoted surgeon and transferred to the 71st Foot, also in Canada, but exchanged two years later to the 52nd Foot and returned home with that regiment in 1847. In May, 1853, he exchanged into the 17th Foot with Surgeon Thomas Cowan, but soon after was made a staff surgeon and sent to the Crimea, where he served throughout the war, including the battles of the Alma, Inkerman, Balaklava and the siege of Sevastopol. In 1855, and before the termination of the war, Cruickshank was promoted deputy inspector-general. When the mutiny broke out he was ordered to India and posted to the Sirhind district. At this time his health was bad, and when on leave, he died at Simla on November 5, 1858.

Colonel Robert Christopher Tytler was the son of Surgeon Robert Tytler, of the Bengal Medical Service. Born in 1817, he entered the Bengal Army in 1834. He had a long and distinguished career, chiefly in the 38th N.I., but also on the staff. He served through the Afghan Campaign of 1842, the Gwalior Campaign of 1843-4, the first Sikh War, and the siege and capture of Delhi after the mutiny. After being commandant at Port Blair from 1862 to 1864 he was employed in the Home Department at Simla, dying there on September 10, 1872. His first wife was the daughter of Dr. Nicolson, of Glasgow.

Surgeon-General George Stewart Beatson was born May 6, 1814, and entered the service as an assistant-surgeon on July 13, 1838. He was almost at once sent to Ceylon where as a staff surgeon he served eleven years. In 1851 he exchanged into the 51st Foot and served with them in Burma and Madras, returning home with the regiment in 1854. Within a few months he went to the Crimea as a staff surgeon, but at the end of the war was put on half pay for two years. Brought back to full pay in 1858, he was soon promoted deputy inspector-general and sent to Corfu,

where he stayed two years till ordered to Madras. While there. on May 1, 1863, he was promoted inspector-general and placed in administrative charge of the whole medical department of His Majesty's Forces in India. Holding that appointment till 1868, he then went home and was at Netley till January, 1872, having meanwhile been given the C.B. In 1872 he returned to his former post at headquarters in India, and a year later was designated Surgeon-General of His Majesty's Forces in India. He died at "Knollswood" in Simla, on June 7, 1874.

Senior Surgeon Frederick Corbyn was born in 1792 and entered the Medical Department of the Bengal Army in 1814. He was soon posted to the 25th N.I. and with them served through the operations on the Nepal frontier for two years. In 1817 he was made medical storekeeper with the army under the Marquis of Hastings, and continued with that force in various parts of Central India till December, 1822, when he was made civil surgeon of Allahabad. Promoted full surgeon in 1826, he reverted to military employ and served successively with the 69th, 68th, and 38th N.I. at various places, including Arakan, in Malacca. In July, 1831, Corbyn was made garrison surgeon at Fort William and held the post till July, 1843, when he was made superintending surgeon of the Sirhind circle, which he held till 1846, when he was transferred to the Lahore circle. While holding that post and when on leave he died at Simla on October 7, 1853. There is a tablet to his memory in Christ Church, Simla.

In the same church is a memorial tablet to Deputy Surgeon-General Oliver Barnett, who, born November 30, 1830, entered the Service on November 24, 1854, as a staff assistant-surgeon. He was then sent to the Crimea where he was employed in the hospital at Scutari. Posted to the 6th Dragoons in 1856, he went out with them to India and served chiefly on the Bombay side. Going home on leave in 1863, he was soon removed to the staff and sent to Netley. At the end of 1865 he exchanged into the 11th Hussars and went out to India with them. In 1869 Barnett was made Surgeon to the Viceroy, the Earl of Mayo, and was with him till he was assassinated in the Andamans on February 8, 1872. He was then appointed Surgeon to the next Viceroy, the Earl of Northbrook, and remained with him till the viceroyalty expired, when Barnett became the Surgeon to the next Viceroy, the Earl of Lytton. On the latter resigning in 1880 Barnett went home and, being now a brigade-surgeon, was posted to Colchester. During the Egyptian Campaign of 1882 he was P.M.O. at Ismailia. Returning

home in 1883 he went to Portsmouth, but in the following year was sent to the Soudan as P.M.O. to the force under Sir Gerald Graham. On his return from that expedition his health was broken and he died at Eastbourne on July 24, 1885. The tablet at Simla was put up by Indian friends.

SRINAGAR.

There is the grave of one medical officer here. It is that of Colonel Richard Hugh Carew, under whom I served and knew well. Born August 10, 1841, he entered the service as a staff assistant-surgeon on September 12, 1865. Going out to India almost immediately, Carew was posted to the 45th Foot, with whom he proceeded to Abyssinia and was present at the taking of Magdala. Returning with the regiment to India he served with it in Burma. On the abolition of the regimental system in 1873 he was removed from the rolls of the 45th and went home. The next year he was sent to the Fiji Islands, where he stayed till 1878. Meanwhile he had been promoted to surgeon-major. Serving only one year at home, Carew went out to India again in 1879 and was stationed at Benares and Darjeeling. Going home in 1885 he served two years in Ireland, and then returned to India, where he soon went on the Sikkim Expedition of 1888, as senior medical officer, and was awarded the D.S.O. After this he was at Pindi and Mian Mir. In 1893 he went home and served three years at Colchester. At the end of 1895 he became colonel and went to Edinburgh as P.M.O. of the Scottish command. There he remained till the end of 1896, when he went out to India and was posted to Pindi. During the next year he was P.M.O. of the Tochi Field Force. He returned to his appointment at Rawul Pindi in 1898, staying there till his retirement for age in 1901. After retirement, he settled in Kashmir, and died at Srinagar on September 24, 1902. Colonel Carew married at Dublin, on February 14, 1879, Janette Elizabeth, only daughter of William Hemsworth, of Abbeville, County Tipperary, Ireland.

WAZIRABAD.

In the Saroke cemetery, near this place, I came across the graves of the three following persons:—

Assistant-Apothecary Robert Barnaby Murphy entered the subordinate branch of the Indian Medical Department on August 6, 1839, as a hospital apprentice. After three years' duty at Fort William he was promoted to the rank of assistant-apothecary on

December 30, 1842. He was then posted to the 29th Foot and served with that regiment through both the Sutlej Campaign of 1845-6 and the Punjab Campaign of 1848-9. Still with the regiment, he died at Wazirabad on May 15, 1849.

Assistant-Surgeon William James Furlonge was born in 1820 and entered the service on April 3, 1846, being posted to the 24th Foot, then at Cork. With the regiment he came out to India in 1847, and served with it through the Punjab Campaign, including the passage of the Chenab and the battles of Sadulapur, Chilianwala and Gujerat. He died at Wazirabad on December 12, 1849.

Assistant-Surgeon John Julius Evan Jacob was born in 1827 and entered the service on April 4, 1851, as an assistant-surgeon in the 10th Foot. He joined his regiment at Wazirabad in the September of that year. He died there on April 5, 1852.

Having now finished my notes, one wonders whether the patient labour associated with their collection will be appreciated by the present generation of men serving in the medical services. One hopes so, and that a perusal of the careers of some of these dead and almost forgotten men may be an example and encouragement to those living in these days. One has attempted to reopen but a few pages of the past, and in so doing may not have noted all that is recorded in those pages. Doubtless there are omissions; if there be, possibly some other student will make them good and even go further by examining God's Acre in other parts, and so adding to the list of our predecessors who have left their bodies in an alien land. Imperfect as this contribution is, it shows how, from Delhi to Kabul and from Srinagar to Dera Ghazi Khan, we have sown the Punjab and the North-west Frontier for more than a hundred years with the bones of our fellows, but what the harvest that is yet to be we know not. To me, in my wanderings in search of these details, the thought has been to examine the past, take from it all that it presents, and thereon create the future. My notes are but of those of whom memorials remain; one has left untouched the records of the nameless dead who have no memorial. Of them the memorial is not that under which their remains are laid, but that in which their glory survives, enshrined in the knowledge that this Empire of ours has been won by men who knew their duty and dared to do it. May they rest in peace.

Clinical and other Notes.

CARBON DIOXIDE SNOW WITH SPECIAL REFERENCE TO THE TREATMENT OF ORIENTAL SORES.

By Captain T. J. MITCHELL.
Royal Army Medical Corps.

The treatment of certain skin diseases by refrigeration with carbon dioxide snow is well known, and many civil hospitals at home use it extensively. After experimenting with it for two years, I think the results warrant its more extensive use in the East.

The apparatus required is simple and inexpensive; it consists of: (1) a cylinder of CO_2 which may be obtained from the nearest soda water factory. The cost of a full cylinder is Rs. 20; (2) a collecting chamber and mould which can be made in the bazaar for a few rupees.

One mould is sufficient and the collecting chamber can be dispensed with, if the following simple method is employed.

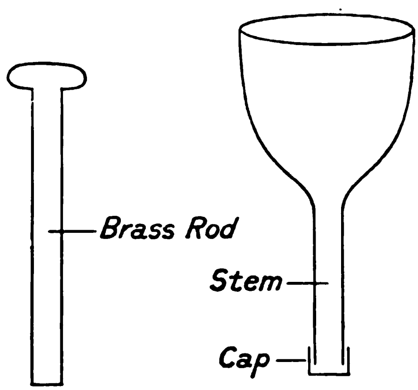


Diagram of Mould.

Two layers of thick blotting paper are rolled tightly round a cylindrical office ruler. A towel is rolled round the blotting paper. The ruler is extracted and one end of the tube thus formed is closed, by doubling up the end of the towel and fixing it with a safety pin. The open end is fitted to the valve of the cylinder and fixed by a bandage.

The cylinder of CO_2 is placed in the vertical position with the valve lowermost. The CO_2 is turned on very gently and allowed to escape until the towel feels hard and solid.

The CO_2 snow is next transferred to a brass mould made like a bottle filler; the stem is fitted with a cap. The CO_2 snow is forced into the

stem and compressed by a brass rod. A pencil of CO_2 snow is formed and can be forced through the stem on removing the cap.

A double piece of lint rolled round the end of the pencil is sufficient to protect the operator's figures.

A well formed and hard pencil has the following advantages: (1) It lasts longer; (2) the pressure on the affected part is more even and better results are obtained; (3) it can be shaped by a scalpel.

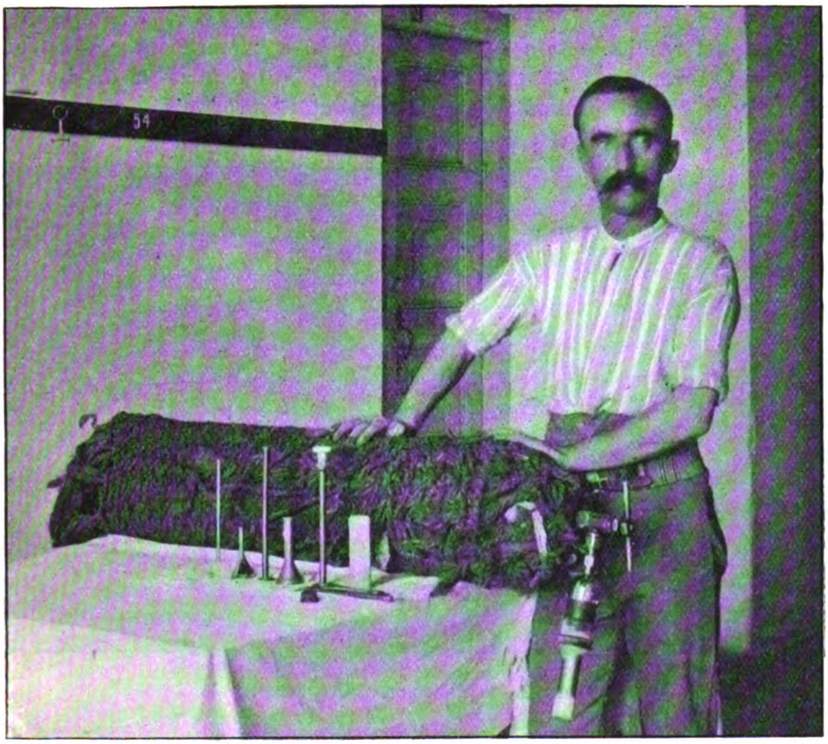


FIG. 1.—Cylinder of CO_2 with collecting chamber and mould attached. On the table different moulds are arranged, pencil of CO_2 snow on the extreme right.

The snow has a temperature of $-79°$ C. and when pressed hard on the skin it freezes the underlying structures, and the frozen area becomes white, depressed and hard.

As thawing takes place redness and turgescence of the part is noticed, and a blister forms in twenty-four to forty-eight hours. Healing goes on under a crust and the resulting cicatrix is smooth, white and pliable.

The effect produced by the CO_2 snow depends on: (1) The pressure used; (2) the duration of the application.

The two factors which determine the pressure and duration are: (1) Situation; (2) depth of the lesion; a superficial lesion over the bony surface of the tibia will require less pressure and a shorter application than a deep lesion over the fleshy muscles of the thigh.

The application usually lasts from five to thirty seconds. The shorter application is necessary: (1) Over a part where the blood supply is poor; (2) when a slight stimulating effect is required; (3) on children.

An interval of ten to fourteen days is allowed between the applications.

The good results obtained are due, not to a bactericidal action but to: (1) A thrombosis of the blood-vessels; (2) exudation of lymph followed by the absorption of the inflammatory products.

FIG. 2.—Application of CO_2 snow.

Pain.—This depends a good deal on the personal factor. A sharp, stinging pain is experienced when the CO_2 snow is applied; and when the part is thawing a dull pain may be complained of for a few hours. The pain is never severe enough to prevent a patient undergoing further treatment.

After Treatment.—A daily cleansing of the part with hydrogen peroxide solution followed by boracic fomentations or boracic ointment gives good results. I have had no bad after-effects such as: (1) Sloughing; (2) scarring; (3) embolism; or (4) shock.

CASES TREATED.

(1) *Nævi.*—Four in number. Two were completely cured and two were greatly improved.

(2) *Warts.*—Five cases were completely cured by four or five applications.

(3) *Sloughing Ulcers.*—Four cases. These healed quickly after one application.

(4) *Ringworm.*—One case. This disappeared after one application.

(5) *Oriental Sore.*—Pathologists are agreed that oriental sores are caused by *Leishmania tropica*, Wright. The infection is supposed to be carried by flies, bugs or other biting insects.

Bugs attack the covered parts of the body, but I have not noticed a single case where a sore developed on the trunk.

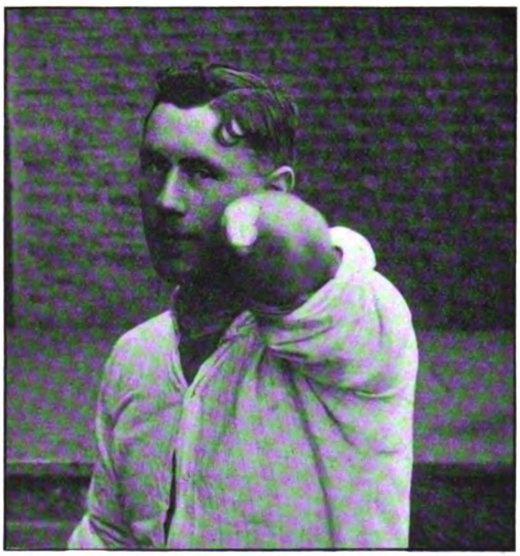


FIG. 3.—White depressed hard area; result of application of CO_2 snow.

Wenyon, who has been working at oriental sore in Asia Minor, states that the disease can be acquired and yet not show any clinical manifestations until five or six months after the period of infection.

I have treated 300 cases of these sores. All were not examined microscopically, and from only a few of those who were so examined could the *Leishmania tropica*, Wright, be demonstrated.

My diagnosis depended on the clinical features and history.

The sufferers were both Europeans and natives.

The King's Regiment alone had in 1912, 24 cases admitted to hospital and 50 cases treated out of hospital.

The numbers in 1913 were 7 cases admitted to hospital, and 80 treated out of hospital.

All either developed sores while stationed in Fort Lahore or a short time after they had returned to cantonments.

No case occurred among the soldiers in the band. They are never stationed in the Fort; only one case reported sick from the R.A., and he frequently visited the Fort.

Situation.—The sores were situated on the exposed parts of the body.

Face	60
Neck	12
Trunk	*Nil*
Upper arm	6
Elbow-joint	42
Forearm	30
Hand	78
Thigh	*Nil*
Knee-joint	36
Leg	24
Foot	12
	300

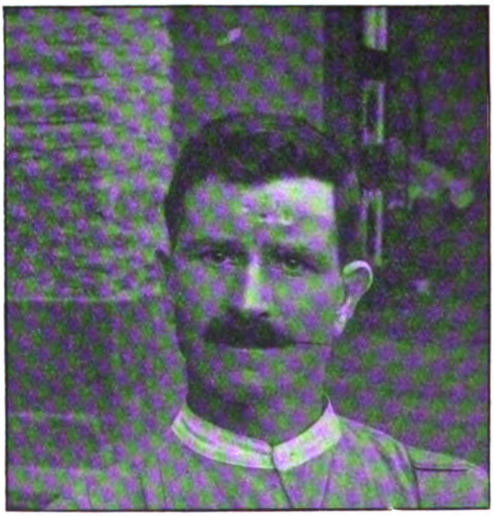


FIG. 4.—Large white smooth cicatrix; a few spots not completely healed.

Duration.—This varied from fourteen days to two and a half years. Average duration four months.

Size.—The size varied from three inches by two inches to a sixpenny piece.

Variety.—Four distinct clinical types were noticed.

(1) Ulcerating sore with hard raised margins. The sore was covered by a hard crust.

(2) A small hard, dark red, slightly raised nodule about the size of a sixpenny piece, usually present on the hands and face.

(3) A large red raised surface with desquamation. This form of sore was common round a joint, e.g., elbow.

(4) An ulcerating surface covered by protuberant, foul granulations. This was most common on mucous surfaces and round the ankles and feet in native patients.

FIG. 5.—Case showing multiple sores.

These varieties might not be considered true oriental sores owing to my failure to demonstrate the *Leishmania tropica*, Wright; or they might be considered different stages of the sore, but prolonged observation and a consideration of their history, course, and reaction to treatment are convincing proofs that they are separate and distinct varieties.

The first sixty sores were treated entirely by applying CO_2 snow at intervals of ten days. The results were, in the majority of cases, satisfactory. The simple ulcerating cases reacted well, but I was disappointed in those cases where the sore was raised above the skin surface or was covered by foul granulations.

These cases I now anæsthetize and, after thoroughly disinfecting the surface and surrounding tissue of the sore, scrape with a Volkman's spoon, paying great attention to the margin of the sore as healing is often sound in the centre, but the margins break down afterwards. The snow is applied before the patient becomes conscious.

The results have been excellent. Scraping alone does not give the same result. My last few cases have all been foul, fungating sores.

One case, an officer in the H.L.I., was sent up from Umballa with a fungating sore on his lip. He had been under treatment for several months, and the *Leishmania tropica*, Wright, had been demonstrated at the Research Institute at Kasauli. This sore was scraped and had two applications of snow. He made an excellent recovery.

Another case sent from Nowshera had suffered from a sore on his upper arm for two and a half years. He had undergone every form of treatment—even excision and skin grafting. He required four applications and was then sent back with a sound pliable scar. The majority of cases, after scraping, only require one or two applications.

When a sore dries up and leaves a raised, uneven, desquamating scar there is a temptation to discharge the patient. This should not be done. A recurrence of the sore takes place sooner or later, and all the trouble begins over again.

The aim of all forms of treatment is to obtain a healthy, soft and pliable cicatrix. Many drugs and preparations have been used and recommended. I do not claim that the CO_2 snow treatment alone is a panacea for all such sores, but I do think that, with perseverance and care, this form of treatment lessens the duration of the disease and gives better results, as shown by the healthy, soft, pliable cicatrix, and reduces the liability to recurrence more than any other treatment tried in Lahore Cantonment. It reduced the admissions to hospital from twenty-four to seven, although more cases were treated, as the patient in many cases can attend hospital as out-patient. The treatment is simple and inexpensive.

IMPROVED METHOD OF CARRYING A WOUNDED MAN BY A SINGLE BEARER.

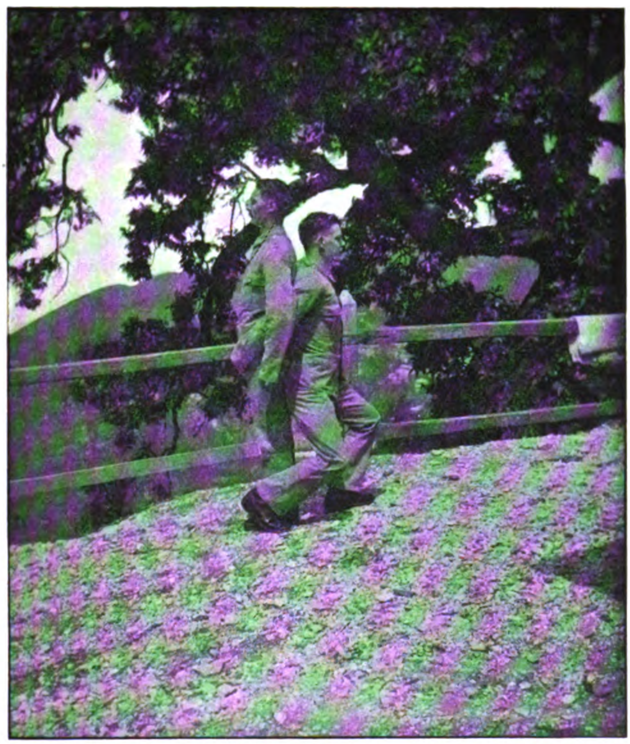
By Captain D. B. McGRIGOR.
Royal Army Medical Corps.

During manœuvres and regimental training in several parts of India the following method of carrying a wounded man by a single bearer has been practised in place of the back lift as described on p. 138, "Royal Army Medical Corps Training, 1911." Regimental bearers have invariably told me afterwards that they could always carry a man much further and much more easily by this method than by the old back lift, and

patients who have been carried express very strong views also complimentary to the improved method. I think when one looks at the photographs and compares them with the plate of the ordinary back lift, p. 138, "Royal Army Medical Corps Training, 1911," that the difference in comfort to both bearer and patient at once becomes noticeable.

DETAIL.

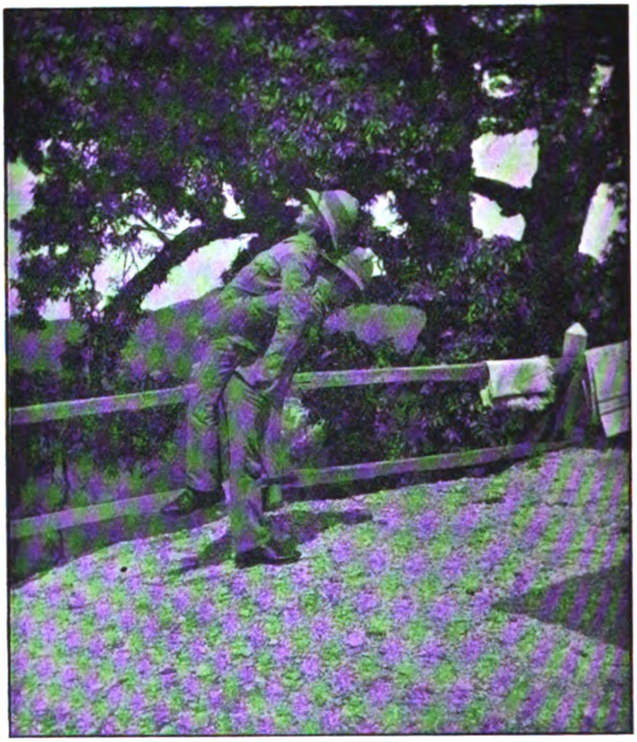
Improved Back Lift.—If the patient is able to stand, place him with his back to yours, bend your left knee slightly forward, place your right foot about nine inches to one foot backwards, and at the same time lower



the right knee as far as required: get the patient's buttocks well in the small of your back, the patient's weight resting on your buttocks, throw your arms backwards round the patient, grasping your left hand with your right in front of the lower part of the patient's abdomen: rise up keeping your own back *hollow* with your body bent slightly forward from the hips, i.e., about 30° forward from the perpendicular.

N.B. The success and ease of this method entirely depends on keeping

your back hollow with the patient's whole weight resting on your buttocks and the strain directly over the large muscles of your legs. There is practically *no pressure on the patient's abdomen* as a light grip suffices to balance the patient on your back.



ARMY BISCUIT RECIPES.

By Miss L. M. BADCOCK.
Quartermaster V. H. D. SOMERSET (No. 106).

For use in these recipes the biscuits are crushed to fine crumbs with a rolling pin: it would be possible to do it between smooth flat stones.

Each recipe makes sufficient for one "helping" as the biscuits appear to be more satisfying when crushed and mixed with other things.

If larger dishes are made by increase of quantities they should be steamed or baked longer.

Fish Cakes.

1 biscuit, crushed.

1 oz. of butter, or dripping, or fat.

1 oz. cooked fish, broken up.
1 cooked potato, mashed.
1 yolk of egg, slightly beaten.
2 tablespoonfuls of milk.
Pepper and salt to taste.

Melt the butter in a saucepan, add all the rest to it, mix well over the fire.

Make into round flat cakes an inch thick, dip into raw egg or milk, roll in fine biscuit crumbs and fry in smoking hot fat.

Or, the same mixture may be put into a flat greased tin, brushed over with egg and baked for half an hour. This is a good fish pudding.

Rissoles.

1 biscuit, crushed.
1 oz. of beef, minced.
1 oz. of butter, or dripping, or fat.
1 yolk of egg, slightly beaten.
A little chopped parsley and onion.
Pepper and salt to taste.

Melt the butter in a saucepan over the fire, fry the onion in it, and then stir all the rest into it for a few minutes.

When partly cold roll into balls, adding a little water if the mixture is too stiff.

Dip each ball separately into raw egg or milk, roll in fine biscuit crumbs and fry in smoking hot fat.

Meat Stock Pudding.

1 biscuit crushed.
¾ pint of stiff stock.
Pepper and salt to taste.

Pour into a pie dish and bake.

Scotch Eggs.

1 egg hard boiled and shell taken off.
1 egg slightly beaten.
1 biscuit crushed.
1 tablespoonful of cold cooked meat minced very fine.
1 tablespoonful of cold mashed potato.
Chopped parsley, pepper and salt to taste.

Mix the biscuit, meat, potato, and flavourings, and moisten with raw egg: put a coat half an inch thick of the mixture all over the boiled egg, dip it in raw egg, roll in fine biscuit crumbs and fry in smoking hot fat. Cut the ball in half before serving.

Raspberry Pudding.

3 dessertspoonfuls of very finely crushed biscuit.
1 egg well beaten.
2 lumps of sugar.

½ pint of milk.

A little grated lemon peel.

1 dessertspoonful of raspberry or other jam.

Put the milk, sugar, and lemon peel into a saucepan, when hot add the biscuit crumbs and stir over the fire for five or six minutes, then pour it on to the beaten egg, return it to the saucepan and again stir over the fire till it thickens. Pour into a pie dish on the top of the jam, and grate nutmeg on the top.

Steamed Pudding.

1 biscuit crushed fine.

1 egg.

½ pint of milk.

Grease a small pudding basin and put the biscuit into it, beat the milk and egg together and pour on the top. Steam for an hour.

Biscuit and Cheese Pudding.

1 biscuit crushed fine.

2 tablespoonfuls of grated cheese.

½ pint of milk.

1 oz. of butter in small dabs.

Pepper and salt to taste.

Put the biscuit and cheese in a pie dish, pour the milk over, put dabs of butter on the top and bake half an hour in a moderate oven. It will do as well if the cheese is cut in very thin slices.

Milk Pudding.

1 biscuit crushed.

½ pint of milk.

1 egg slightly beaten.

1 tablespoonful of sugar.

Pour into a pie dish and bake.

Rice, barley, &c., might be added to the biscuit.

Biscuit Toast and Water.

Put biscuit crumbs in the oven and bake until they are quite brown: pour boiling water on them, lemon and sugar may be added. Can be drunk hot or cold.

A MODIFIED SYSTEM OF ACCOUNTING FOR MEDICAL AND SURGICAL SUPPLIES IN MILITARY HOSPITALS.

By Quartermaster-Serjeant W. E. SQUIRES.
Royal Army Medical Corps.

A few notes on a suggested revised method of accounting for medical and surgical supplies may be considered as being of some interest.

Increased efficiency and a reduction in the number of Army Forms and clerical work, necessary for the preparation of the various returns is the object of the following amendments.

Storage of Supplies in Military Hospitals.

In the larger military hospitals it would be found convenient to have all medical and surgical supplies in one store for general issue to the dispensary, out-stations, and units in the district. The sub-charge of dental, X-ray, and operating-room appliances could, it is suggested, be arranged for by the officer in charge of the military hospital.

Supplies.

The supply of medicines, etc., to be half-yearly at home, half-yearly to hospitals, and annually to general medical stores abroad, as at present, with the addition of a routine monthly indent on Army Form "I 1209" for drugs, dressings, etc., required in excess of the half-yearly or annual supply. Shortage of important drugs and material could not then occur, and local purchases and intermediate demands would, except under unforeseen circumstances, be of rare occurrence.

Indents.

Army Form "I 1209," prepared in quadruplicate by the carbon process, could, I suggest, be utilized for all purposes. In order to facilitate issues from army medical stores and contractors, a separate sheet could be used for each section of the official priced list. The original and duplicate, after approval, would be available for use as invoices at army medical stores or by contractors, the triplicate copy being retained at the War Office. The quadruplicate form to be kept at the station for reference if necessary.

Apart from the reduction of clerical work in compiling the present requisitions (one form, "I 1209," being used instead of four) the undermentioned Army Forms would no longer be required :—

Army Form	I 1213	Requisition for Medicines.
,, ,,	I 1219	Requisition for Surgical Materials.
,, ,,	I 1222	Requisition for Trusses.

Returns.

At many of the district headquarter hospitals at home issues and receipts of medical supplies to and from R.A.M.C. Territorial and Special Reserves units, also regular field medical units, during the training season, are of frequent occurrence. No provision (other than the issue and receipt voucher) is made for the accounting of these transactions, in detail, at the time. Great difficulty is therefore experienced in arriving at the actual expenditure of any given drug in the hospital from the completed return (Army Form I 1214). The quantity shown in the "expended" column includes *all* issues during the period, irrespective of the amount actually consumed in the hospital itself and that sent and expended elsewhere.

To arrive at the actual quantity used at the station an abstract of issues from the vouchers would necessarily have to be prepared, deducting

the amount from the total shown as "expended," thus involving much unnecessary clerical work.

A suitable ledger is suggested, with printed headings, arranged by sections, including dental, X-ray appliances, and field medical equipment held on charge for mobilization and instructional purposes. The ledger to be of sufficient size to allow of entries of receipts and issues being made as they occur. At the close of the period the account would be balanced and the stock ledger and voucher in support examined and checked by a Board of Survey. The remains, as certified by the Board, to be carried forward to a new ledger. After verification by the Board the ledger and vouchers to be submitted for examination, accompanied by the following documents :—

(1) Indents in triplicate on Army Form I 1209.

(2) Fair wear and tear certificates.

(3) A list of all stores, held on charge, surplus to requirements.

The expenditure of any item during the period could be ascertained from the ledger when the indents for the ensuing period are under consideration.

Administrative officers would also be furnished with the means of checking receipts and expenditure in detail without the lengthy process of reference to items issued and accounted for on the numerous vouchers submitted with the return. The ledger and vouchers could be returned to the station for custody, after audit, and would then be available for examination by the chief accountant if required.

By the above procedure the following Army Forms would be rendered unnecessary :—

Army	Form	I 1214	Half-yearly Return of Medicines.
,,	,,	I 1214 (*a*)	Return of Dental Stores.
,,	,,	I 1214 (*c*)	Return of Operating Room Instruments.
,,	,,	I 1233	Board of Survey on Mobilization. Field Medical Equipment.

Disposal of Surplus Stores.

It must frequently happen that if an excess of a particular drug is held on charge at a hospital, it is, or will be, required at another station.

If a list of all drugs, dressings, and appliances surplus to requirements is rendered with the ledger, instructions could be issued by administrative officers for their disposal as follows :—

(*a*) Direct transfer to other hospitals in the district, if in need of the same. This information could be ascertained from the indents, which would be reduced in proportion to the supply available for transfer from hospitals.

(*b*) Return to Army Medical Stores for re-issue to other stations as required.

The saving effected under this heading would be considerable, and would, moreover, prevent unavoidable accumulation of drugs, etc., at stations.

Transfer on Relief of Officer in Charge.

When a transfer between officers occurs the ledger would be balanced to date of transfer. It would be unnecessary to open a new ledger if a certificate be furnished, accompanied by a statement signed by both officers showing any discrepancies at the date of transfer, a copy being retained at the hospital for the adjustment of deficiencies or surpluses, if any.

General Medical Stores.

The system outlined above could also be adapted to general medical stores. The revised ledger in use at present fulfils all requirements. If the ledger is forwarded for examination in place of the return, the following Army Forms could also be dispensed with :—

Army Form I 1215 Annual Return of Medicines.
,, ,, I 1215 (*a*) Abstract of Vouchers.
,, ,, I 1215 (*b*) Blank Sheet for Annual Return.

General Remarks.

If a scheme on the above lines is sanctioned and adopted the advantages, apart from the reduction in clerical work and number of Army Forms, would be many. Officers in charge of hospitals would be able to obtain additional supplies at comparatively short notice. There would be no shortage of necessary drugs, dressings, and intermediate indents and local purchases would be reduced to a minimum. An outlet is also provided for articles unlikely to be required, and by the methods proposed the undermentioned Army Forms could be entirely abolished :—

Army Form I 1213 Requisition for Medicines.
,, ,, I 1214 Half-yearly Return of Medicines.
,, ,, I 1214 (*a*) Return of Dental Stores.
,, ,, I 1214 (*c*) Return of Operating Room Instruments.
,, ,, I 1215 Annual Return of Medicines.
,, ,, I 1215 (*a*) Abstract of Vouchers.
,, ,, I 1215 (*b*) Blank Sheet for Annual Return.
,, ,, I 1219 Requisition for Surgical Materials.
,, ,, I 1222 Requisition for Trusses.
,, ,, I 1233 Board of Survey on Mobilization Equipment.

Echoes from the Past.

RECOLLECTIONS OF GENERAL PRACTICE.

(From the Middle of 1857 to the Middle of 1883.)

By Surgeon Major-General Sir A. FREDERICK BRADSHAW,
K.C.B., K.H.P.

In the Journal of July, 1912, an "Echo from the Past," written by me, was fortunate in having gained insertion. It ended with the remark that I could discourse at length upon various professional subjects which I had to deal with in my days long bygone, such as occurrences more or less noteworthy in general practice, experiences with children, psychological management of patients and of their friends.

I do not propose "to improve this occasion" of continuing the discourse in question by regaling possible readers of this paper with dissertations on microbes, or with recondite theories of the causation of diseases; interesting revelations such as those are imparted at the Royal Army Medical College by the learned professional and pathologist gamaliels, at whose feet young army medical officers sit with receptive minds and earnest attention. It may, however, prove to be a small relief to turn for awhile from the austerity of severely scientific studies to some light medical reading, to some notes of well-remembered cases met with in my practising career.

Very probably it will be seen that in the following pages the personal pronoun "I" occurs frequently—too often, no doubt. But I wish to state at the outset that really I do not think myself a fine fellow! There is nothing more corrective of personal conceit than the lively recollection of grievous mistakes, and of such profoundly regretted errors of judgment, there are several at my discredit. One in particular torments me still; and although I will not deepen my mortification by disclosing what it was, my cheeks still burn when it comes back unwelcomed to memory; vainly do I wish that mental ghost could be laid for ever. Happily for me no harm whatever resulted to any one. It was owing to a hasty resort to the method of saltation in coming to an opinion. The lesson against jumping to a diagnosis was never afterwards lost upon me; never since did I act as if endowed with infallibility!

It often occurs to me when reading medical journals that attention is chiefly given to rare and difficult cases of disease, and

too seldom to the disquieting indispositions with which a family doctor so commonly has to deal. And I wonder if newly fledged medicoes of the present day begin private practice with the same confidence and knowledge of petty details of nurseries and sick rooms, which their predecessors trained by apprenticeship possessed. As in daily life money transactions are mainly with small value coins, so in daily professional association with families, minor ailments come chiefly under notice. In these days of highly developed specialism, it is a possible danger that the army medical officer may not always keep in mind to aim at becoming a good all-round doctor. On foreign service and in isolated positions self-reliance and extended usefulness will have to be learnt, in order to escape humiliation and lasting self-reproach through ignorance of means of relieving pain or of the commoner ailments of women and children. I have known an army doctor say to a mother anxious about her sick child: "Oh, I know nothing about children!" I much regretted I had not the power to relegate him to half-pay for a year to be spent in "walking" a children's hospital or in assisting a family doctor. I have even known an army man decline to pull out the badly aching tooth of a woman, asserting that he had not practised dentistry!

The recollections which I am about to mention do not comprise abstruse or mysterious cases, or even very remarkable occurrences, but they may supply hints on points which are of real moment in practice.

I had much to do with children, especially with those whose "only language is a cry," and as I happened to be fond of the little ones—having eight left of ten of my own—I took special pains to study their ways and complaints, and in time became quite able to pose as an authority in any nursery, no matter how experienced the nurses and mothers might be. But then, when I found them reasonable, I generally took them into consultation, knowing well that being women, they were endowed by Nature with quickness of observation, and often with intuitive soundness of judgment. A *confrère* with whom I discussed a case differed in that opinion; the child's mother was remarkable for penetration and close observation, and my colleague comforted her by saying that he never listened to a mother's or nurse's statements about a child patient. Thereafter I refrained from asking his advice in consultation cases.

Once I was called to see a baby which during a long journey had been so constantly fretful and troublesome that the parents

had to halt for medical advice. On entering the room, I noted that the mother was young and inexperienced; she was holding her baby uncomfortably and seemingly without any idea how to soothe it. In accordance with my invariable custom when dealing with the case of a baby, I directed the mother to strip it entirely and put it on a warm rug and on a bed. Immediately the baby was freed from all its garments, it stopped crying, and began to investigate its toes after the manner of its kind. After careful examination I satisfied myself, and the parents as well, that the little one was not ill at all, but had been persistently chafed at the neck by a stiffly starched saw-edged shirt. It was a great surprise to both father and mother that an infant could so vigorously and so long complain of a local irritation.

I think that when a child of very tender age is supposed to be ill, the doctor should insist always upon seeing it quite naked. If there is any hesitation on the part of the person in charge of the child, the stripping should be made a decided request, and the suspicion entertained that something is desired to be concealed, as a chafe owing to neglect or a blister from a hot-water bottle, or at least something. It is not satisfactory or convenient to examine a clothed baby, and discomfort to it from a garment is eliminated. In another case a mother asked for advice about her baby which had been crying unaccountably most of the night, could not be pacified, and yet did not seem to be ill. I suggested that as any ailment could not be discovered, possibly a needle or pin had been pricking the baby frequently. The mother could not accept this as a probability, but next day she confessed that she had found a needle in the bedding and a mark on the baby's heel showing where the needle had stuck in!

A mother brought her baby to me, and stated that for some little time it had had constant action of the bowels, the motions being curdy, greenish, white, and scanty. There did not appear to be any abdominal uneasiness, and the baby was neither thin nor fretful. Suspecting that the rectal membrane might be irritable, I directed the mother to wash out the rectum with syringefuls of warm water, and to give every four hours a powder composed of a minute quantity of grey powder and the same of carbonate of soda. This was really a "placebo," as the baby took food well and had not any disturbance of digestion. Presently the mother noticed that the fewer the motions the less well the child seemed to be. It became evident that restraining the bowel actions did harm rather than good, and eventually the mother and I satisfied our-

selves that as the baby did go on thriving while the looseness continued, it would be better to let things alone. After awhile the evacuations became natural in appearance and frequency.

At a Himalayan station where I was on duty I had to look after soldiers' children. Although the height above the sea was over 6,000 feet, the sun had dangerous power, but the mothers did not appear to understand that its heat could harm their little ones. Among infants cases of congestion of the brain occurred in unusual numbers, almost to epidemic extent. The treatment adopted and found to be most useful consisted in dosing with calomel, two gr. at a time, the body being kept warm. How the mercurial acted I do not know, but act it did and well. The hospital matron's own baby got ill and she begged for calomel, being convinced by observation of its beneficial effect, a confidence in the drug which was duly rewarded.

At another hill station many young children came under my supervision, and among them several cases of continued fever were met with. Sometimes the fever would last only a week or go on for a fortnight or even to twenty-one days; fortunately none turned out badly. But one little boy of 4 years caused me anxiety; he did not get sleep, and I was afraid to administer any soporific, being uncertain as to suitable dose and possible effect. He sat on his bed fretful and difficult to manage. Sleep being urgently necessary I had recourse to a novel expedient. Borrowing from a jeweller's shop close by a large musical box I put it on the child's bed and set it going. At once he stopped whining and began to cuddle the box. Before long the tinkling sounds soothed his nervous system so much that good sleep ensued. The case did well, and the musical box contributed then and afterwards greatly to recovery.

During the hot weather in the plains the parents of some children complained to me of the exasperating naughtiness of their little ones which even slight severity failed to check, and asked my advice. Of course I made a point of seeing the supposed delinquents and found that the misbehaviour was really a manifestation of nervous irritation from the excessive heat of the weather. The parents were rather astonished and grieved when told they had beaten sick children! The nature of the case was explained to them and that it was necessary to tranquillize the harassed nervous system of the little ones. Accordingly I made the mother produce a teaspoon, a glass bottle and some water. Into the bottle I put one gr. of acetate of morphia and with forty teaspoonfuls of water dissolved it. Next I had the bottle labelled with "sedative

solution," and enjoined the mother to keep the bottle and teaspoon always together in order to prevent mistake as to quantity of dose. The morphia acted like a charm after three or four doses of a teaspoonful each at hourly intervals. The mother was told that the medicine was not intended for making the children sleep but only for soothing their nerves. Thereafter there was not trouble about "naughtiness."

One day, also in the plains, I was hurriedly summoned to see a baby alarmingly ill with sudden convulsions. Arriving without delay at the bungalow close by, I was told the baby had died, and dead it certainly seemed to be. But the happy thought occurred to me that as death was so very, very recent it might be worth trying what artificial respiration could do. Taking the body on my lap I began the process. How long I persevered I do not know, but eventually spontaneous breathing was set up, feebly and at intervals; then there was a cry and I was rejoiced to see light come back into the eyes and respiration become quite re-established. The baby was not under my care and I saw it that once only, but I know that it regained health and grew up.

I may mention respecting convulsions in children that ordinarily I treated the cases by inhalations of chloroform. They always controlled the seizures without any harmful effects. In one family I taught the mother how to administer the vapour with safety and to what permissible extent; her two little girls were very subject to convulsions.

Instances of the medicinal use of alcohol have not been uncommon. A striking case was that of a fine, strong baby which had become dangerously collapsed in consequence of severe diarrhœa. The mother was directed to give brandy slightly diluted; with her finger tip to drop five drops every few minutes into the baby's mouth and not to stop while benefit seemed to be derived. Next morning the patient was comparatively convalescent and I inquired how much brandy had been given. The bottle was produced and seen to be half empty; it was of ordinary size and fresh from the shop; the mother said she had not dared to stop dropping as the need of the stimulant continued to be evident so long. The baby certainly appeared to be none the worse for the free potations; he recovered well from the bowel complaint.

Occasionally I prescribed an alcoholic liquid for children not really ill but languid in constitution and obviously needing a stimulant. The tonic ordinarily ordered is in the form of a tincture and this is made with spirits of wine. Now to give forcibly

to a child a "nasty medicine" is a grievous offence to it, arousing open or secret resentment, and as I credited the tincture with effect mainly because of the spirit excipient I generally selected a liqueur instead. One quite little boy was always looking pale and below par, but had not any ailment. His system needed a fillip. I directed the mother to put a teaspoonful of curaçao in an ounce phial and fill up with water for a day's consumption; a little was to be given with meals, never on the empty stomach. At first she objected to the alcoholic remedy, alleging that her husband being a confirmed teetotaller might not approve it. In turn I explained that a medical man could hardly be expected to make his selection of remedies dependent upon non-medicinal sanction, and I desired her to give to the child what I, the responsible adviser, considered best for him to take. I heard nothing more on the subject, and after several weeks' trial of the "medicine" the mother was convinced that it had done the boy good.

A case quite unique in my experience I may put on record. I was hastily sent for to see a baby which had been taken ill suddenly and alarmingly. I found the little patient recovering somewhat from collapse, and employed suitable restoratives. But neither disease nor injury was apparent. The mother said that after giving the baby the breast as usual, it became almost immediately ill to a degree that frightened her. Noticing that the mother seemed capable of animation, and possibly possessed "a temper of her own," I drew a bow at a venture and guessed: "I suppose you had a quarrel with your husband this morning?" She looked much surprised, and admitted that she had had. I went on: "You were furiously angry with him I dare say?" A reluctant "yes, she was." "While angry, you took up baby and nursed it?" "Yes." "And then it got ill?" "Yes" again. "Well," I rejoined, "your child has had a narrow escape from convulsions, and, perhaps, death; the milk of a suddenly infuriated mother is a rather dangerous poison to an infant; so you had better not nurse yours any more, or else resolutely refrain from outbursts of angry temper." She was much startled, and effusively promised not to endanger her baby again.

The case of an infant born very weakly and kept alive by a method of incubation is interesting. The parents were healthy and the pregnancy of usual duration. But the baby was so frail that it was feared she would not survive. It occurred to me that it was of primary importance to maintain and reinforce the bodily warmth. Accordingly the largest india-rubber hot-water bag obtainable was half filled with hot water, and the air squeezed

out, a soft cushion resulting. Under this a folded blanket was placed, and upon it a layer of flannel to receive the baby. A fire was kept up in the room and relays of warmed flannels laid constantly on the body. It was impressed upon the father, a very loving parent, and most useful in a sick room, that reliance was placed mainly on unremitting continuance of the warmth, supplemented with diluted warm milk and an occasional drop of brandy. Owing to the steady perseverance for several days of the family and servants the "incubation" proved successful. The infant throve and grew up to be a fine girl.

Of midwifery cases and diseases of women I had some experience. One of the former interested me much at the time. The patient was a well-built and robust Irishwoman in hospital for her confinement. She was not under my personal care and commonly parturition, when ordinary in its course, was superintended by the hospital matron. When going in the evening round the men's and women's wards, I inquired how the patient was getting on, as I had heard that labour pains had set in. The matron said that everything was going on all right, but her tone made me suspect that she was not quite certain. I saw the patient, and, making the usual examination, discovered that so far from "going on all right," delivery was hardly likely without manual assistance, the presentation being breech! With infinite care I proceeded to turn, not very easily, and ultimately the child was brought into the world, but unfortunately dead. The mother recovered quickly and completely.

One case which I attended ended in death, very greatly to my surprise, as the labour was normal in every respect. After the child had been born, the placenta removed and the patient duly bandaged, she complained of feeling faint, and died immediately. It was difficult to account for the sudden death; there was no flooding, no convulsions, nor any insensibility. Eventually I ascertained that the patient, an Eurasian, had been in the habit during pregnancy of eating rather largely small earthen saucers such as were used in illuminations when filled with oil and provided with a wick. I think she had so interfered with the nutrition of her own body that Nature had kept her alive only for the sake of her child until its birth, and then allowed collapse of her vitality. The infant was healthy and did well.

Once I met with a very rare occurrence in a lying-in room. I had agreed to attend a patient who said she was expecting a baby at a date not distant. In due course a summons to the house

came, and, on arrival, the monthly nurse reported that the pains were going on regularly. After awhile, as much progress was not apparent, I proposed to make sure that things were all right while there was time to do anything which might need to be done. I set about ascertaining in the customary manner, and presently discovered to my amazement that the uterus was of unimpregnated size, and no trace of a fœtus outside it. Knowing how keen the disappointment to the patient would be, and appreciating her mortification, I took extreme care to satisfy myself as to the non-existence of the expected baby. As I anticipated would be the case when informing the husband, friends, and nurse, their incredulity was strong. Eventually I turned to depart, saying I would call in the morning to see the new-born child. I went and found the patient up and dressed, confused and most reluctantly convinced of her mistake as to pregnancy. The abdominal enlargement had been merely distension from wind and the "labour pains" simply colicky.

Soon afterwards I had a case of quite opposite character. A lady, thinking, hoping, and doubting that she was enceinte, asked me to satisfy her on the subject. I found that most certainly she was "in the family way," but could not convince her. After some time she came again, still tormented with hopes and doubts. I then tried to reassure her by means of the ballottement method. She admitted that she felt during the process something jumping up and down. It was explained that as the jumper could not be a fish, it was really a baby. She replied, "When you talk to me, you free me from doubts, but when I get home, they return worse than ever!" I told her that as she had not any disease which could be detected and as she admitted feeling quite well, she had better wait to see what time would reveal. Needless to say labour pains and the appearance of a baby finally dispelled all misgivings.

A lady who was feeling distressed because motherhood had not fallen to her lot consulted me as to possible cause of the barrenness. Examination showed that owing to chronic subacute inflammation of the lining membrane of the cervix, the channel was closely blocked with mucus so thick and tenacious as to yield passage only to the hydraulic pressure of the menstrual fluid. Simplicity of remedial measures having always appealed to me, I decided to recommend the systematic application of water as warm as could be comfortably endured. The method of the irrigation and the effect aimed at were explained in detail to the patient, who steadily persevered with the treatment. The undue secretion of mucus was

reduced to natural quantity and condition, and ultimately pregnancy ensued; and was repeated several times.

A lady who married after her first youth became pregnant and was exceedingly desirous of having a child. In due time a baby was born but unfortunately arrived dead. She took her lamentable disappointment so much to heart that she drifted into a melancholy which it was feared might be rather lasting. In these circumstances it appeared to me that a strongly decisive effort ought to be made to dispel the deep depression. I consulted with the husband and explained that in my opinion the cure practically depended upon his co-operation, which he readily promised. The plan was that he should administer a severe moral shock which might prove of permanent good effect. He was to alter his conduct towards her, to change from a devotedly loving and sympathizing manner to harshly manifested indifference. At once she noticed the change and became much startled and alarmed, with consequent emergence from the melancholy and with anxiety to regain her husband's affection. I believe my method of moral cure was unfolded to her after a time, and that she was not ungrateful to me. Pregnancy again ensued and this time a son was born alive. It was most pathetic, her sobbing relief from suspense when she heard the infant cry, which I took care it should, with the encouragement of a spank. It throve well and the mother's happiness was touchingly great.

A young wife, just confined of her first baby quite naturally and without any notable suffering, professed inability to pass water and some bladder distension was appearing. As there did not seem to be any good reason why she should not micturate, and it being advisable to refrain, if possible, from encouraging by the use of a catheter the patient's want of will power, I told the husband to frighten her by saying that if she did not make water soon, the doctor would have to come with a big instrument and draw it off. The intimation had speedy effect and nothing more was mentioned by her of the imaginary difficulty.

As a quaint experience, I may note the case of a lady under my care with typhoid fever. The patient was progressing satisfactorily, and, in fact, convalescence had begun. But one day, an hour or two after I had paid my morning visit to her, a message was brought in haste that she was dying. I had felt certain when I saw her in the morning that nothing untoward was at all likely to happen; however, I hurried to the house and found the family tearfully surrounding the bed and the patient taking mournful leave of them all.

Kneeling by the bedside I felt the pulse and found it full, soft and regular. Evidently there was nothing serious the matter. Seeing me cheerful and apparently unconvinced as to danger in the case, and hearing me make a remark or two of anything but dismal character, the surrounding faces cleared and the owners of them began to sidle out of the room. I then questioned the nurse: "Mrs. —— was feeling a little down, I suppose, and you gave her a little brandy?" "Yes," was the reply. "Show me the bottle," I said: It was half empty; it then became evident that the nurse had made her invalid maudlin! I comforted the husband by telling him that the brandy had gone to his wife's head a little and that there was nothing to fear in consequence. I did not afterwards refer to the affair when seeing my patient, but she did with some embarrassment.

A useful lesson was taught me at a bedside on one occasion. I was seeing the patient for the first time, and on feeling the pulse was concerned at finding it small, almost thready and weak. But I did not perceive in the case any alarming symptoms, and yet the quality of the pulse excited apprehension. I bethought me of examining the other wrist pulse and found a vigorous beat of ample volume. The patient had one abnormal radial artery. Thereafter I made it a rule, before arriving at an opinion as to the state of the circulation, to feel both pulses, taking care to keep the arms well away from the sides of the body in order to avoid squeezing pressure upon the axillaries. The advantage of this precaution was brought home to me on more than one occasion.

Extraction of teeth occasionally came in my day's work, and in one case the circumstances were somewhat ludicrous. A young woman, wife of a soldier clerk, came to have a tooth pulled out. She was duly placed in a chair and the offender examined. But the moment the forceps was brought near her mouth she clutched my hand. These two actions were repeated so constantly in succession and for so long a time that I gave up trying to overcome her opposition and sent her with a note to the local dentist of perhaps more persuasive charm. She came back with a message from him to the effect that having spent more than half an hour in the endeavour to get at the tooth, he had to dismiss her. Apparently she really could not restrain herself from preventing extraction, although she sat quietly in the chair and did want to lose the tooth. Again I tried to induce her to let me remove it, but without success. I then called in my Mussulman servant armed with basin, towel and tumbler of water. To my astonishment she then opened her

mouth, admitted the forceps and submitted to extraction without the least demur. I asked her why she had given me and the dentist so much trouble. Her answer was that she was ashamed to behave in a silly way before the native! Being an Englishwoman she had the usual strong racial feeling, and could not endure the thought that a native should secretly laugh at her.

Another case of dentistry is worth mention. A young and very pretty lady had so troublesome a toothache that she determined to submit to having the delinquent taken out. The doctor on the spot declined to extract, alleging (so I heard) that he had not the heart to give more pain to so charming a patient. As I was reputed to be aiming at all-round usefulness as a practitioner, I was invited to appear on the scene. Accordingly I went to her house—at a neighbouring hill station—but failed to induce her to allow me to use the forceps. For about a couple of hours her courage failed in spite of marital and friendly coaxing. At last I resolved to try a method of mental counter-irritation. Suddenly I glared at her and said sharply: "Do you think it fine to make all this fuss?" Her eyes sparkled with anger and astonishment; she opened her mouth and out came the tooth. I deemed it expedient to leave the room soon and to explain to the husband that nothing short of my stratagem would have sufficed to inspire his wife with the necessary fortitude, and that I had felt impelled to suppress my own feeling of sympathy for her suffering in order to relieve her of pain. The husband appreciated the expedient, but I suspect that the lady did not forgive me for making her respond involuntarily to my simple ruse.

A third dental case interested me by its result. A 16-year-old frail-looking girl was brought to me by her mother, the girl having insisted that one of her back teeth should be pulled out. I examined with care the tooth complained of but could not see any trace of decay or anything wrong with the adjacent gum, so I demurred to her losing a tooth apparently quite sound, and, besides, so firmly fixed in place. However, she was determined that it should come out, said that she had borne the aching for a very long time and would not endure it any longer. Reluctantly I extracted the tooth; there did not appear to be anything unusual in its exterior condition, but upon crushing it there was found in its centre a globule of pus about the size of a large pin's head. I think the girl was pleased by the proof of foundation for her enmity to the molar.

Cases of insanity in women rarely came under my care. One is deserving of record here. The patient was young, thin, duskily

pale, had been confined a few weeks previously, no appetite, and eyes rather glaring. She began at my first visit to talk about the devil and other matters of delusion. Thinking it would be judicious to converse with her as with a sane person, I remarked that I had heard of the devil but had not had opportunities of meeting the individual, and professed desire to know more about him. She proceeded to give me information. After awhile I said that a little medicine sometimes made one's ideas clearer about the devil and his works and persuaded her to promise to take some to that end. I supplied her with a batch of seidlitz powders with instructions to take one night and morning ; but they were to be dissolved in warm water and not taken till the effervescence had quite stopped. She did follow the advice, and as the tartrate of soda pervaded her body the delusions began to fade away and before long she regained normal mental health. I had rather in mind the old doctrine of peccant humours and fancied that such might possibly be diluted away.

In family doctor practice it is useful to take quietly note of the patient's domestic surroundings. I had a young lady under my care recovering from an attack of continued fever. Her convalescence was slow and she was depressed, but I could not account for lowness of spirits. It occurred to me that perhaps the collateral details of the sick room were not quite favourable. The women relations were dressed in black and moved about on tiptoe and with bated breath in order not to disturb the invalid. Heavy curtains were shutting out most of the daylight and the air was made heavy with sympathy ! Suspecting that the patient's mind was being burdened with this funereal fuss I said so to the family and ordered the curtains to be fully drawn back, the windows opened, the black raiment to be changed for brightly coloured dresses, the piano to be played upon, and laughing voices to be heard. Immediately the sick girl brightened up, convalescence was accelerated and complete recovery soon followed.

(*To be continued.*)

Reviews.

X-RAYS: AN INTRODUCTION TO THE STUDY OF RÖNTGEN RAYS. By G. W. C. Kaye, B.A., D.Sc. London: Longmans, Green and Co. Pp. xix and 252, $8\frac{1}{2} \times 5\frac{1}{2}$. Price 5s. net.

This is "not a treatise or a handbook," but gives an account of those methods now employed which appear valuable or novel, of which, so far, no account is available, except in scattered form in various journals.

Chapter IV gives a full account of the various forms of tube now used, with their various advantages. Chapter XI (fourteen pages) deals with "practical applications," radiography and the physiological and curative action of X-rays; this chapter is not long, but is full of practical information. The following points may be noted: The pronounced and very soft secondary rays emitted by bismuth and other heavy metals may actually be injurious. For instantaneous radiography, single rapid photographs may be obtained by simple means, e.g., by joining up the primary of a modern heavy coil to a *direct* current lighting circuit, with the usual fuses; when the current is turned on the fuses are blown and the consequent interruption produces a powerful discharge in the secondary winding and tube in connection with it.

Reduction of the exposure to about one-twentieth may be obtained by using a fluorescent screen such as the Sunic, coated with tungstate of calcium. The measurement of dosage by a pastille is a very rough method, giving only an approximate result, fairly trustworthy for short exposures, but not for those exceeding ten minutes or so.

Some internal organs, especially the spleen, are much more sensitive than the skin; white blood corpuscles are affected, but the red are very resistant. Bacteria are hardly affected, in marked contrast to the action of ultraviolet light. For therapeutic use, the rays must be sufficiently hard to reach and be absorbed by the diseased tissues; where these are deeply seated, the softer and less penetrating rays should be screened off, for which an aluminium screen half a millimetre thick is sufficient.

The rest of the book deals with its subject chiefly from the physical side. It includes an historical sketch of the discovery of Röntgen rays, and of the development of the subject both in theory and practice. It is of extraordinary interest and value to any one who may have the means and opportunity to follow out the lines of investigation described.

The theory of Professor Laue that X-rays are light rays of wavelengths comparable with the diameter of the atom, and therefore that interference should take place at the surfaces of the regular groupings of atoms in a crystal, and its confirmation experimentally by Friedrich and Knipping, and later by others, especially Bragg, reminds one of the prediction of conical refraction by Hamilton and the experimental verification by Lloyd. These beautiful results and their effect on our knowledge of the structure of crystals are fully described and illustrated.

One other point may be referred to: the extraordinary range of the wave-lengths of electromagnetic waves. The longest (Hertzian) waves range from 15,000 metres, or about nine miles; those used in wireless telegraphy from a few thousand metres to something under a centimetre.

The infra red, invisible rays of the spectrum run from 0·013 to 7·7 × 10·5 cm.; the visible spectrum from that point to 3·6 × 10·5, the ultra-violet from the same length to 10·5, while X-rays are somewhere about 10·9 cm. in length. These electromagnetic waves then cover "the amazing range of about one thousand million million fold."

Appendix II describes Dr. Coolige's X-ray tube, in which the cathode is electrically heated and the vacuum is extremely high. The intensity of the X-rays is precisely controlled by the heating of cathode, and at high temperatures (about 2300° C.) an enormous output is possible. There are other subsidiary advantages, and Dr. Kaye thinks the tube indicates a very great step forward.

This book can be confidently recommended to any one who is not content with the ordinary empirical knowledge which suffices to obtain practical results under ordinary and almost constant conditions. Some of it is by no means easy reading without a fair knowledge of modern developments in physical theories. R. J. S. S.

Die Chronischen Erkrankungen der hinteren Harnröhre. Von Dr. Erich Wossidlo. Leipsig: Verlag von Dr. Werner. 1913. Price: Paper, M.10.0; Cloth, M.11.6.

Undoubtedly it is as illogical to attempt to treat chronic diseases of the urethra without the help of a urethroscope as it is to treat chronic middle-ear disease without a mirror and speculum. Yet it is astonishing how many consider themselves quite capable of dealing with chronic urethritis without any such help. In fact, there are some who consider the urethroscope of no assistance whatever, though it is difficult to understand how any method which makes the diagnosis clearer can be useless, or how it is possible without looking to diagnose, e.g., a papillomatous condition of the posterior urethra from simple inflammatory œdema. Unfortunately, there are no works in English which deal really thoroughly with posterior urethroscopy, though the English translation of Luy's work is excellent in many ways, and for this reason an English translation of the work under review would be very welcome. The best feature of this book is that it is illustrated with a large number of coloured illustrations of all conditions of the posterior urethra in health and disease, and these, with the careful description of the appearances, the diagnosis and treatment, make this book one which will prove of the greatest assistance to its readers. T. W. H.

A Handbook for Voluntary Aid Detachments, Germany (*Leitfaden für Sanitäts-Kolonnen vom Roten Kreuz*). By Hermann Baumann. Hanover: Published by Jänecke Bros. 1912. Pp. 219. 8vo. Price 1s. 5d.

This is a small handbook in which a large number of circular-letters, emanating from the Prussian Central Red Cross Committee, have been collected under the various headings to which they have reference, such being for instance :—

(1) Conditions under which Voluntary Aid Detachments are recognized and considered fit for employment.

(2) Dress and equipment.

(3) Training of sick attendants and men employed in disinfection duties.

(4) Employment on mobilization.
(5) Subsidies.
(6) Parades, inspections, etc.
(7) Insurance of members against accidents in peace time, and so on.

While the book was originally compiled by its author to facilitate reference work in the offices of Voluntary Aid Detachments, it is full of useful information, and anyone interested in Red Cross organization and administration will find it full of useful hints.

Some of the circular-letters are of a laudatory nature, others are written to indicate a different line of action required by the central governing body. Altogether their perusal makes one realize how well organized the German Red Cross Societies are, and how large a degree of uniformity throughout these numerous societies has been obtained by the governing Central Red Cross Committee.

Current Literature.

The Ambulance Dog (*Le Chien sanitaire*).—An able article penned by Méd.-Major Bichelonne and Captain Tolet appears on the above in the *Archives de Médecine et Pharmacie militaires* for June, 1914. The article deals with the history of the movement, the rôle that these dogs will play in war, how they should be trained, and the class of animal to be selected for this special education.

The writers enlarge on the difficulties that the stretcher-bearer will have to contend with in modern wars; his work will to a large extent be carried out at night and it will often be very difficult to work with lights. They quote Motais, who maintains that in recent wars one-third of the men reported as missing must be counted among the dead.

The ambulance dog has had most success in the German Army, where there are said to be about 2,000 trained dogs registered for mobilization purposes. The ambulance dog has received official recognition in France and four to six of these trained animals will be allotted to each bearer company on mobilization. There are at present about fifty trained dogs and another fifty in training. A non-commissioned officer of the medical corps from each army corps is sent to Fontainebleau every year to the military dog-training school to learn how to look after these animals and how to train them. The course lasts three weeks.

A national society called the *Société Nationale du chien sanitaire* has been formed to provide for the training of dogs, and it already has several branches in France. Some of the voluntary aid societies are also interested in the matter.

With regard to training the article discusses three methods: The dog is trained (1) to bark when a wounded man has been found, or (2) to return to the stretcher-bearer after finding a wounded man and then bark, or (3) to bring back something belonging to the wounded man. The last method appears to be the best.

The employment of the ambulance dog on the battle-field would be on the following plan: The stretcher-bearers first skirmish over the ground

and collect all the wounded that they can see. They then return with the dogs and go over all the likely places to which wounded men may have crawled to get into cover. This is the scheme for working during the day. The search must be done systematically, and each group with their dog must work over a definite area. The dog works from side to side, follows the scent, and when it finds a wounded man it brings back his cap or handkerchief to the stretcher-bearer. The leash is placed on the dog and the stretcher-bearer is led to the patient. The dog will probably work better at night, but the stretcher-bearer's task will be no light one.

The training of the dog should be undertaken when it is 5 or 6 months old; it is taken out on a leash and taught obedience. The dog is also allowed to run loose, and should be frequently called to heel. When a dog is called never go to him, always make him come to you. Training to "fetch" requires a lot of patience. The animal is first taught to "take" and "give"; the length of time it has to hold things in its mouth is gradually increased. It is then taught to "fetch," and it must not be allowed to drop things. When out walking the animal should be made to carry various things in its mouth. It should also be taught to jump over obstacles and to take to water.

The second part of the training should not be undertaken until the dog is well disciplined and "fetches" to order. He then receives instruction on the dummy, and then with men lying concealed on the ground. He is taught to search the pockets for loose objects such as a handkerchief in case the wounded man has lost his cap. It requires a lot of patience to teach the dog to return to the wounded man after bringing back the cap or handkerchief; endeavours have to be made to let the dog see what is required of him, and one way of doing this is to make him carry the cap on the way back to the patient for the first few lessons and also not to put him on the chain. When this lesson has been mastered some night practices are undertaken.

The dog is then taught to look for a certain number of men placed in a certain order and it must find them again in the same order. The work is gradually extended over a distance of several kilometres. The dog must also be accustomed to march with infantry and to work with stretcher-squads and it must be accustomed to infantry and artillery fire. As a rule this presents no great difficulties. A dog may be considered well trained when, having found his master lying out as a wounded man, he returns without hesitation to bring back assistance.

The article concludes with some interesting notes on the various breeds of dog which have been trained for this purpose in different countries. J. V. F.

The Origin of some of the Streptococci found in Milk (*Journal of Agricultural Research, Department of Agriculture*, vol. i, No. 6, March 25, 1914).—A collection of cultures of streptococci was made consisting of 42 cultures from milk which formed chains in lactose bile at 37° C., 51 cultures from infected udders, 114 cultures from bovine fæces, and 39 cultures from the mouths of animals. The morphology varied under different conditions and could not be correlated with the source of the culture, except that the udder cultures had a more marked tendency to chain formation than those from other sources. The ability

of these cultures to liquefy gelatine and to form acid from dextrose, lactose, saccharose, raffinose, starch, inulin, mannite, glycerine, dulcite and adonite was determined. When glycerine was attacked, the fermentation proceeded slowly, failing to reach its maximum in fourteen days, in contrast to the fermentation of the sugars, in which the maximum was reached in two or three days. A high percentage of the udder cultures failed to give the characteristic reduction in litmus milk. Twelve cultures liquefied gelatine; one of these came from milk and eleven from infected udders.

The cultures from fæces were characterized by their activity in fermenting the sugars, including raffinose, and their inability to utilize the alcohols.

The mouth cultures fermented dextrose, saccharose, lactose, mannite, and frequently raffinose, but were almost without effect on starch and glycerine. The udder cultures were characterized by the general lack of fermentative ability, which was limited almost entirely to dextrose, saccharose, and lactose, with a comparatively small number utilizing mannite, glycerine, and gelatine.

When the udder cultures were divided on the basis of gelatine liquefaction, two groups were obtained. The fermentative activities of one o these, which are similar to those of *Streptococcus pyogenes*, were limited to dextrose, saccharose, and lactose, with an occasional culture fermenting mannite, starch, or inulin. The second group fermented the three simple sugars, mannite, and usually glycerine, and liquefied gelatine.

When the milk cultures were considered individually, it was found that with the exception of two which clearly came from fæces they could be included in one or the other of the two groups into which the udder cultures were divided.

Of the forty-one non-liquefying udder cultures twenty-four gave identical reactions. The remaining cultures differed from the type in one or two characters only.

Specific Serological Reactions with Pneumococci from Different Sources.—The fact that persons suffering from acute pneumonia show, during the height of the disease, little, if any, variation from the normal in the opsonizing and agglutinating powers of their sera for the pneumococcus, and that strains of this organism, when freshly isolated, are seldom amenable to phagocytosis under the influence of normal sera, has rather tended to discredit opsonic estimations in work with this disease. Dr. F. S. Lister, however (The South African Institute for Medical Research, December 22, 1913), has made the important observation that the sera of patients just after the crisis possess powerful opsonizing properties for pneumococci derived from the patient concerned, and for certain allied strains. The importance of these results depends upon their applicability in the differentiation of strains of pneumococci from various sources, as well as on the light they appear to throw on the mechanism of the crisis itself. The value of this power to group pneumococci on serological grounds will be obvious when, as in South Africa, there is a question of the use of prophylactic inoculation against pneumonia. Unfortunately a few strains of the organism appear incapable of evoking the production of any antibodies whatever and therefore

cannot be grouped by this means. Dr. Lister depends on the almost complete inability of normal sera to cause phagocytosis of "virulent" pneumococci and notes as positive the action ot "critical" sera in bringing about the ingestion of germs, often in uncountable numbers, by phagocytes. Some observations on the action of heated sera would be of great interest. C. J. C.

Flavour of Roquefort Cheese.—James N. Currie, Chemist, Dairy Division, Bureau of Animal Industry, U.S.A., has carried out an investigation on the identification and explanation of the occurrence in Roquefort cheese of substances which contribute a particular and peculiar peppery or burning taste, so well known in this and some other cheeses.

The ripening of this cheese is due solely to the presence of the penicillium roqueforti, which will grow in the presence of inorganic salts such as are contained in Czapek's solution, when cane sugar is wholly replaced by pure butter fat, tributyrin, ethyl butyrate, glycerol, butyric acid, or ammonium butyrate. The mould has not only the ability to hydrolyze esters and triglycerides, but can also utilize their constituents as sources of carbon.

As the author states this would presuppose the presence of a lipolytic enzyme in the organism. To obtain definite proof of this, enzymotic studies were made on the mycelium of penicillium roqueforti grown for six days on Czapek's solution and the conclusion drawn was that the penicillium roqueforti produces a water soluble lipase, which is the chief factor in the hydrolysis. The other conclusions arrived at were :—

(1) During the ripening of Roquefort cheese a considerable amount of fat is hydrolyzed.

(2) The hydrolysis results in the accumulation of the acids of milk fats in both the free and combined forms.

(3) Of these acids, caproic, caprylic, and capric and their readily hydrolyzable salts have a peppery taste, and are responsible for the characteristic burning effect of Roquefort cheese upon the tongue and palate.

W. W. O. B.

Migration of the Adult Tertian Malarial Parasite.—Dr. Mary Rowley-Lawson (*Journ. Exp. Med.*, May, 1914) maintains that the malarial parasite is extra-cellular throughout its existence, and that, except for brief periods when it is free in the blood serum, it is attached to the external surface of the red corpuscle. The evidence in favour of migration from cell to cell is as follows: (1) The great destruction of red cells, not to be accounted for on the assumption that each parasite destroys only one cell; (2) multiple infections by young parasites, all of which cannot grow in one cell, and which must migrate if they are to survive; (3) apparent stages in parasitic migration observed, namely, pigmented parasites free in the blood serum, pigmented parasites attached to cells, the hæmoglobin of which is apparently unaltered, pigmented parasites in various stages of development on decolorized red corpuscles and on corpuscular skeletons, pigmented parasites partly on and partly off degenerated red cells, dehæmoglobinized remains of red corpuscles frequently seen free from parasites.

The writer describes and illustrates with photomicrographs and

drawings, parasites partly on and partly off degenerated red corpuscles, and states that in a series of slides from one specimen of blood of a case which had received no quinine she found over a hundred of these, from which she argues that this appearance is more likely to be due to migration than to damage during the operation of spreading the films. Further, she maintains that if the parasite had been forcibly squeezed out from the substance of the cell, the latter would not have regained the even contour which is shown in her specimens.

She considers that the ring form of the younger parasites is connected with their mode of attachment to the surface of the corpuscle, and that they become firmly fixed by forming a band round the base of a "peripheral mound" on the red cell. C. J. C.

The Origin and Development of Gametes in Malignant Tertian Malaria.—D. Thomson, writing in the *Annals of Tropical Medicine and Parasitology* (April 21, 1914), gives deductions from observations carried out by him in conjunction with W. M. James in Liverpool and Panama. The development of crescents from the asexual spore appears to be due to some immunity or resistance of the host towards the latter. In support of this he instances the facts that crescents are formed in comparatively large numbers in mild and chronic cases, and in cases with a history of previous attacks, in adult patients and among those who have a high percentage of hæmoglobin and leucocytes, or who have palpable spleens, and also where quinine has been administered in insufficient doses.

Undeveloped crescents practically never appear in the peripheral blood. Fully developed crescents appear suddenly ten days after the appearance of asexual spores, that is, most usually about the fifth day after the attack of fever. Enumerations of crescents were made several times daily for several weeks and graphs constructed. These showed a definite rise at the periods corresponding to ten days after sporulation followed by a quick fall from which it is concluded that the majority of the crescents perish within two or three days, and the total period of their existence is estimated at less than twenty days. Cases where crescents persist in the blood for eight weeks are explained by the assumption of the persistence of small numbers of asexual forms held in check, but not destroyed, by the patients' immunity.

The development of crescents was traced through its stages by examination of autopsy smears. The protoplasm in all stages stains a faint greyish-blue often with a yellow tinge, in contrast to the deeper blue of the asexual schizonts. The chromatin stains fainter, and is less abundant and more finely granular than in the schizonts, while the pigment is present in the earliest stages and always remains scattered. No evidence was obtained of parthenogenesis in crescents.

After the blood is drawn crescents become spherical in about four minutes, and flagellation takes place in from four to fifty minutes, and occurs even after thorough quinine treatment. No evidence was found in support of the theory that flagellation may take place in the circulating blood of a patient. C. J. C.

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THE TREATMENT OF ACUTE EMPHYSEMATOUS GANGRENE.

(Preliminary Communication.)

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AND

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IN the present European conflict the outstanding feature of medical importance is the incidence amongst the wounded of cases of tetanus and acute emphysematous gangrene. As to the actual extent to which these two conditions are prevailing, it is impossible as yet to say. It is evident, however, that sufficient material is forthcoming upon which to base a more extended knowledge than is at present extant. The very high mortality previously associated with both these diseases is generally recognized in all text-books on surgery. Thus in Rose and Carless' "Manual of Surgery," 1911, under the heading of "Acute Spreading, Acute Emphysematous or Spreading Traumatic Gangrene," appears the following: "This is one of the most rapidly fatal and serious conditions met with in surgery."

The object of the present communication is to draw attention to a new method of treatment of emphysematous gangrene, which in our hands has been attended with well-marked success.

Amongst the cases of shell and gunshot wounds admitted to No. 8 Military General Hospital at Rouen, France, during the months of September and October, there occurred seventeen examples of gangrene affecting the extremities. Three of these were of the purely traumatic variety and directly due to interference with the vascular supply. The remaining fourteen, on the other hand, were all types of the condition variously termed infective gangrene, emphysematous gangrene, or hospital gangrene; eight of these involved the upper extremity, and six the lower. All were the direct result of severe shell wounds infected on the field by earth or refuse. The first three cases admitted to the hospital were treated upon existing lines, and all rapidly proved fatal. The first patient was extremely weak and toxæmic upon arrival, and did not recover from the shock attendant upon amputation through the upper third of the thigh. In the remaining two patients the gangrenous area had already extended to the abdominal wall and amputation was out of the question. Both cases were treated by application of hydrogen peroxide to the wounds, but both rapidly succumbed.

The fourth patient also appeared *in extremis* when he reached the hospital. He had been wounded on September 14, during an engagement on the Meuse, and reached Rouen three days later. Upon arrival he presented a very large lacerated wound upon the posterior aspect of the right knee, extending upwards into the muscles of the thigh. The wound was extremely foul and the tissues around were œdematous, devitalized and emphysematous. Typical blebs were present on the skin surrounding the wound, and from the contained fluid a long un-encapsulated anaerobic bacillus was cultivated. Amputation was performed through the upper third of the thigh, but at the operation it was evident that the infection had spread to a high level, and that it was impossible to remove the limb above the area involved. The patient was much collapsed and the operation was concluded as rapidly as possible. Within twenty-four hours it was evident that the infection was spreading rapidly in the flaps covering the stump. It then appeared to one of us that it might be possible to limit the spread of the disease by infiltrating the tissues above the gangrenous area with oxygen. The handiest method available was the injection of hydrogen peroxide into the tissues under pressure. Small incisions were made therefore *into the healthy tissues above* the infected area, and through these punctures hydrogen peroxide was pumped into the subcutaneous and sub-

fascial planes by means of a Higginson's syringe. The evolution of oxygen was rapid and the stump soon assumed enormous proportions, emitting a resonant note on percussion. From this moment the spread of gangrene was arrested. The existing gangrenous portion sloughed away, the surrounding skin area assumed its normal tint, and the circulation was re-established. The man made an uninterrupted recovery and when convalescent was transferred to England.

The success which attended this case decided us to employ the same method on a subsequent occasion. On September 30 the next opportunity occurred. A patient was admitted with a large lacerated shell wound on the outer surface of the left thigh in its upper third. A very offensive discharge was present and the skin around was discoloured and sodden. Œdema, with definite crackling on palpation, extended up to the crest of the ilium. The patient was jaundiced and his general condition very weak. Amputation of the limb could not be entertained, and hydrogen peroxide (10 vols.) was injected subcutaneously above the line of the advancing œdema. Small punctures were also made through the tissues just above the wound and hydrogen peroxide was injected under pressure. Twenty-four hours later it was evident that the infection was arrested. The jaundice disappeared, and subsequently the whole gangrenous area came away in a huge slough involving skin, subcutaneous tissues, and fascia, leaving a very large granulating area. This had considerably diminished in size when the patient was transferred to England, his general condition being excellent in every way. Thiersch grafting was necesary to restore the limb to its functional ability.

The rapid arrest of the infection in these two cases proved to us that in the method we had not only a valuable means of saving life, but also of obviating the necessity for amputation and so preserving the function of many limbs that otherwise would be sacrificed. In fact, since adopting infiltration we have not found it necessary to remove a single limb for acute infective gangrene. The procedure now adopted by us in all cases where infection of a wound by anaerobic organisms is suspected may briefly be summarized as follows:—

Operation.—Half an hour before operation the patient receives a hypodermic injection of atropine sulphate $\frac{1}{100}$ gr. and morphine tartrate $\frac{1}{4}$ gr. General anæsthesia as a rule is employed, but if the patient is profoundly septic, and the wound involves the lower extremity, spinal analgesia is recommended. A point is then

selected three to four fingers' breadth above the line of advancing gangrene as shown by the dusky, copper-coloured tint of the integument. An incision about ¼ in. in length is made through the skin and subcutaneous tissues as far as the fascial sheaths of the muscles. A pair of sinus forceps is then introduced into the wound and the whole of the subcutaneous tissue opened up as widely as possible. The nozzle of an ordinary Higginson's syringe is introduced into the incision and neutral hydrogen peroxide (10 vols.) at body temperature pumped into the subcutaneous spaces under pressure. The dissemination of oxygen is aided by kneading and massage. It is essential that the belt of oxygen be complete above the line of advancing gangrene, and therefore it is usually necessary to repeat the procedure at various points. This done the gangrenous area itself is treated in a similar manner by puncture and infiltration. Finally the wound is thoroughly explored and cleansed. All foreign material and dead and contused tissue is removed and the cavity irrigated, first with normal saline to wash away debris and clot, and then freely with hydrogen peroxide. Drainage by rubber tube and gauze is established and the whole limb dressed with dry gauze and wool. Although much drainage may be anticipated we consider it a mistake to employ huge quantities of wool and gauze in these cases. The aim should be to allow free access of air to the wounded tissues, coupled with efficient protection to the same.

The operation is followed by considerable shock, due undoubtedly to the wide separation of connective tissues and stimulation of nerve endings. The usual measures are instituted to combat the shock, and morphia is freely administered to relieve the pain, which is generally very acute. At the close of the operation the limb, in the case of the upper extremity, is ballooned to twice its normal size and the emphysema frequently extends to the trunk and neck. In our series of cases shock was much more marked when the upper extremity was involved than in the case of the lower. A point of pathological interest is the bright yellow colour of the fluid which exudes from the tissues of the diseased limb on section. This is even more evident in the presence of hydrogen peroxide. What the exact nature of the pigment may be, it is impossible with our limited facilities at the front to ascertain.

Risks of the Operation.—We consider that the dangers of the operation are mainly twofold: (1) Shock; and (2) air embolism. As previously stated, there is undoubtedly an element of shock associated with the procedure, due to the stimulation of nerve endings and varying in degree with the extent of the area infiltrated. It

is most marked in our experience in cases where the upper extremity is involved, and especially when it is necessary to infiltrate the subcutaneous tissues of the thorax. At the same time the collapse is no more severe than that associated with amputation carried out under similar conditions, and it can certainly be combated by care and the adoption of ordinary measures. The operation should not be performed without general anæsthesia, and an allusion has already been made to the value of the spinal method of analgesia in cases involving the lower extremity.

As regards the risk of air embolism, we have not had a fatality of this nature directly attributed to the operation. At the same time we recognize its possibility and advocate particular care in avoiding trauma to veins both at the sites of puncture and also during the separation of the subcutaneous tissues. Concerning a third possible objection, that the operation may not be efficient to check the progress of the infection, in our experience this risk does not exist. Certainly in every case in which it has been employed arrest of the gangrene has been assured. Further experience with a longer series of cases may cause us to modify this statement, although a consideration of the facts, both clinical and *post-mortem*, go to prove that acute infective gangrene of the type now occurring in France is essentially a local process spreading by direct continuity in the subcutaneous tissues, and that it can be effectively checked by the establishment of "outposts" instituted in the manner described.

In our cases the organism present has almost invariably been the *Bacillus aerogenes capsulatus*. In two cases only did it prove to be the bacillus of malignant œdema.

The results so far obtained may be stated as follows:—

Total number of cases	14
Upper extremity	8
Lower extremity	6
Cases treated by infiltration	11
Cured	8
Cases not treated by infiltration	3
Cured	0

Of the three deaths occurring in cases treated by the infiltration method, one was due to osteomyelitis of the femur and septicæmia; another to shock; whilst the third was a fatality under anæsthesia in a subject of lymphatism and not attributable to the condition present or to the operation. In the case of osteomyelitis of the femur an extensive compound comminuted fracture was present. The anaerobic infection was completely arrested when septicæmic symptoms developed, and this was confirmed by autopsy.

The conclusions at which we have arrived, and on which we are at present basing our practice, may be stated as follows :—

Conclusions.—(1) Acute infective gangrene due to *B. aerogenes capsulatus* or *B. œdematis maligni*, in the case of the extremities, is at first a purely local process spreading by direct continuity in the subcutaneous tissues. The muscles and deeper tissues are only involved in the immediate neighbourhood of the wound. When gangrene of the whole limb exists it is due to severe trauma, especially to the main vessels. Acute infective gangrene and traumatic gangrene may be superimposed.

(2) Amputation of a limb for acute emphysematous gangrene is unnecessary unless the whole of the tissues are involved over a very extensive area. It is sufficient to remove only dead and dying tissues and *amputation high above the infected area is contra-indicated and may prove fatal from shock.*

(3) Infiltration of the healthy subcutaneous tissues with oxygen above the line of spreading gangrene is sufficient to check the advance of the infection and in the majority of cases the limb may be saved.

(4) The most convenient means of applying nascent oxygen to the tissues is by the injection of warm neutral hydrogen peroxide.

(5) The operation is not unattended by risk, and care must be taken to obviate shock and trauma to veins.

Note.—Since this paper was written four other cases of acute emphysematous gangrene have been admitted to No. 8 General Hospital. Three of these involved the upper extremity and one the lower. All have been treated by the method of infiltration and all have recovered without the sacrifice of a limb.

One of these cases was further complicated by severe tetanus and was successfully treated by daily lumbar injections of anti-tetanic serum (1,500 units) and the adoption of the Trendelenburg position.

The direct subcutaneous administration of oxygen or air apart from hydrogen peroxide is under consideration as a means of checking the spread of anaerobic infection.

Under circumstances (such as, perhaps, in clearing hospitals and ambulance trains) where the more thorough method of infiltrating hydrogen peroxide cannot be carried out as above described, it is possible that injecting it in smaller quantities with an antitoxin or other suitable syringe might arrest the disease until, at least, the patient arrived at a fixed hospital. We have treated a case successfully by this method.

A PRELIMINARY REPORT ON SOME FURTHER INVESTIGATIONS ON KALA AZAR IN THE SUDAN.

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Introduction.

The Sudan Kala Azar Commission was formed in October, 1909, and the following month commenced its investigations at Singa, an outstation in the Province of Sennar, where the disease was known to exist. For nearly four years researches were carried out and valuable evidence was obtained.

In October, 1913, it was decided to close the Commission, and, if possible, to continue the investigations in Khartoum. One difficulty, however, presented itself, viz., the lack of opportunity of obtaining suitable clinical material, but, thanks to the kindness of Lieutenant-Colonel H. A. Bray, Principal Medical Officer, Egyptian Army, arrangements were made for the transfer of cases of kala azar from outstations to the Military Hospital, Khartoum, and every facility was given to study the disease and obtain material.

Khartoum has never proved itself to be an endemic centre of kala azar—a fact not to be ignored—particularly when researches necessitated the use of a large number of animals for inoculation purposes.

Inoculation Experiments.

A preliminary series of experiments were performed to ascertain what animals in the Sudan were susceptible to an infection with the parasite of kala azar. For these experiments intraperitoneal inoculations with infected material were carried out and positive results were obtained in the following animals :—

(*a*) Grey monkey, *Lasiopyga callitrichus* (I. Geoffroy, 1851). This animal was formerly described as *Cercopithecus sebæus.*

(*b*) Jerboa, *J. gordoni.*

(*c*) Gerbil, *G. pygargus.*

(*d*) Pup, *C. domesticus.*

In the gerbil and jerboa the disease appears to run a chronic course in no way impairing the health of these animals. Negative results were obtained in guinea-pigs, rabbits, cats, a kitten, a

cheetah and pigeons. A dog was also inoculated intravenously with material obtained from a splenic puncture. The animal did not develop any symptoms and was killed seven months later, but no Leishmania parasites were found in either the spleen, liver, or bone-marrow.

Cultural Characters of the Parasite.

For the study of the cultures, strains have been obtained from infected monkeys and from spleen and liver punctures carried out on three kala azar cases. The Leishmania parasites grew readily at 22° C. on Novy-McNeal-Nicolle medium containing defibrinated rabbit's blood. Cultures were also obtained on ox blood serum, and on Buchanan's medium containing 1 per cent. neutral red.

As rabbits could not easily be obtained in this country, some experiments were made with defibrinated sheep's blood as a substitute, but without success, as the defibrinated blood of the sheep exercised an inhibitory influence on the growth of the flagellates of *Leishmania-Donovani*. With the flagellates of Leishmania tropica, however, no such effect was produced.

In suitable media fully developed flagellates appeared about the third day, followed by multiplication and by division, resulting in rosette formation, and as the cultures became older the parasites reverted to their original type, losing their flagella and becoming thick-walled oval cells or cysts. The cultures grew readily under anaerobic conditions, but the growth of the flagellates was not quite so luxuriant as in aerobic cultures.

The Cytological Characters of the Flagellate.

To study the cytological characters of the flagellate young cultures were used, so as to obtain dividing forms and avoid degenerating or altered forms. The preparations were wet fixed, and stained either with iron hæmatoxylin or Giemsa; when the latter was used the technique employed was that recommended by Surgeon-General Sir David Bruce for trypanosomes, the specimens being finally differentiated by orange tannin. In using the iron hæmatoxylin stain it was found advisable to put up several preparations illustrating various degrees of differentiation.

By these two methods of staining, the main characters of the tropho- and kineto-nuclei could be observed. In a culture six days old flagellates of varying sizes and in various stages of development could be seen in the same preparation. The body of the adult flagellate measured 14 to 21 microns in length and 1 to 2 microns

in breadth, while its flagellum measured 16 to 24 microns in length. The tropho-nucleus occupied a more or less central position, was vesicular in type, and limited by a well-defined nuclear membrane on the inner surface of which could be seen fine chromatin dots. Within the nuclear sap zone and occupying a central position was an intensely staining karyosome; but in none of the preparations was it possible to observe a centriole in the interior of the karyosome. Between the tropho-nucleus and the anterior extremity of the body the clearly stained karyosome of the kineto-nucleus could be seen as a rod lying transversely to the long axis of the parasite. In some flagellates this rod was slightly curved, with the convexity in a posterior direction. In iron hæmatoxylin stained specimens the karyosome was often found occupying the more or less central position of a clear zone which, as in the tropho-nucleus, was limited by a nuclear membrane. Some flagellates showed the karyosome in an eccentric position and frequently opposed to the posterior area of the nuclear membrane.

At the anterior portion of the nuclear sap zone and close to the karyosome a basal granule could be frequently seen, the so-called blepharoplast; from the basal granule the rhizoplast originated. In some of the flagellates, instead of a definite basal granule being present there was a thickening of the rhizoplast, which represented its site of origin. Flagellates were also found in which the rhizoplast appeared to originate directly from the karyosome; it would be difficult to state definitely whether in such cases a false impression was given, owing to the fact that the basal granule was in reality in a lower plane than the karyosome.

In specimens stained by Giemsa and differentiated with orange tannin, the nuclear membrane of the tropho-nucleus showed the presence of numerous fine granules. These were more frequently seen in dividing forms of the flagellates, and in all probability corresponded to chromosomes. Other granules were seen between the tropho-nucleus and the posterior extremity which resembled the volutin particles met with in trypanosomes. It was never possible to demonstrate any filament connecting the tropho- with the kineto-nucleus.

In the dividing forms the process of fusion usually commences in the basal granule of the kineto-nucleus, and is followed simultaneously with a division of the rhizoplast and flagellum. The new rhizoplast soon becomes detached from the other at its anterior extremity, and it, in turn, gives origin to the new flagellum. During this process the karyosome of the kineto-nucleus becomes

elongated and constricted in its centre. Elongation continues and each half of the karyosome moves further apart, till complete separation occurs.

From what can be observed in wet fixed specimens the tropho-nucleus undergoes similar changes to the kineto-nucleus, the nuclear chromatin dividing into two separate masses; but, prior to this, numerous granules are seen within the nuclear membrane. The division of the tropho-nucleus usually follows that of the kineto-nucleus, but in some instances a flagellate is observed with two tropho-nuclei and but a single karyosome in the kineto-nucleus.

Biological Experiments.

The Effects of Sunlight.—The condensation fluid of a culture seven days old was taken into a glass pipette and then sealed. The pipette was placed in an open vessel containing water which was kept at a temperature between 22° and 27° C. After twelve hours' exposure to bright sunlight the contents of the pipette were examined, and numerous active flagellates were found. Stained films showed that cystic formation was also proceeding.

The Effect of Temperature.—A culture seven days old showing a heavy infection with flagellates was taken for this experiment. The culture fluid was taken into a sterile pipette and incubated at a temperature of 31° C. At the end of four days only cysts, but no flagellates, were found. A culture ten days old was subjected to a temperature of 41° C. for a period of twelve hours. When examined microscopically, most of the flagellates were motionless and showed large numbers of granules in their cell cytoplasm. Others were seen in the intermediate stage between fully developed flagellates and cysts, while numerous cysts were also observed. The culture was then incubated at 22° C. and examined four days afterwards, when numerous active flagellates were found.

A third subculture seven days old was pipetted off and placed in a water bath at a temperature of 50° C. At the end of fifteen minutes the flagellates were found to be practically motionless, only showing a slight oscillatory movement of the body, but no movements of translation were apparent. Differentiation between kineto- and tropho-nucleus was quite distinct. At the end of half an hour the flagellates were entirely motionless, with their flagella straightened out. The body appeared to be swollen and hyaline looking, and there was little differentiation between the tropho- and kineto-nucleus. The culture fluid was then inoculated into fresh N.-M.-N. media but no growth occurred, the temperature of 50° C. having killed the flagellates in half an hour.

The Effect of 0·2 *per cent Hydrochloric Acid.*—An equal amount of a culture seven days old and 0·2 per cent hydrochloric acid was placed in a sterile watch-glass and examined at intervals. At the end of five hours, active flagellates showing well-marked translatory movements were present.

The Effect of Tap Water.—One cubic centimetre of a culture eight days old was pipetted off into a watch-glass containing 1 c.c. of tap water and kept at room temperature, about 80° F. At the end of five hours a few active adult flagellates were still present, but most of them were undergoing cystic formation, the cells becoming rounded, with the flagella still showing active movements.

The Effect of Sterile Distilled Water.—Five cubic centimetres of sterile water were added to 1 c.c. of a culture five days old and kept at room temperature. At the end of thirty-six hours active flagellates were still present, as well as rounded cyst forms, with and without flagella. The experiment with sterile distilled water was repeated, but the mixture of culture and water was kept at 22° C. At the end of six days it was found that the flagellates had become cysts, which developed again into flagellates when subcultured into fresh media.

The Effect of River Water.—Equal quantities of river water and a culture fifteen days old were mixed and incubated at 22° C. At the end of twenty-four hours all the flagellates had developed into cysts. The bacterial count of this sample of river water represented 228 micro-organisms per 1 c.c.

The Effect of B. coli.—Equal parts of a young culture of flagellates and an emulsion of *B. coli* were mixed, and incubated at 22° C. At the end of twenty-four hours most of the flagellates had become motionless, and appeared as if they had been killed *in situ.* A few Leishmania cysts were found.

The inference drawn from these few experiments is that the cultural forms of *Leishmania donovani*, as met with in the Sudan, are possessed of greater vitality than they are given credit for in other countries. Under unfavourable conditions, short of immediate death, the flagellates tend to revert to a cystic stage, where, possessed with thicker walls, they are apparently endowed with greater vitality, and capable of greater resisting powers. They correspond to the cystic or post-flagellate forms of herpetomonads found and described by Patton [2] and myself in the hind gut of the bug.

Lygæus militaris.—As far as the writer knows, few experiments on these lines have been carried out. Their possible bearing on the transmission of the disease in the Sudan will be referred to later.

Agglutination Experiments.

Some experiments were carried out to note whether specific agglutinins were present in the blood serum of a patient suffering from kala azar. A young culture of flagellates, six days old, obtained originally from the patient, whose serum was to be tested, was mixed with equal portions of that patient's serum and the mixture examined microscopically in a hanging drop preparation. The flagellates almost immediately lost their motility and a slight but not very appreciable amount of clumping occurred—at any rate not sufficiently marked to suggest the presence of specific agglutinins.

The control experiment with the blood serum of a healthy individual was also used, and an interesting result obtained. The flagellates immediately became motionless, and their flagella remained extended as if they had been killed *in situ*.

Further tests were carried out, the serum being diluted 1: 10 and 1: 50 with distilled water, but no evidence of agglutination occurred either in the patient's or in the normal serum. The patient's serum was again tested for evidence of agglutinins after he had been treated by an autogenous vaccine, but no evidence of these specific substances was found.

Bandi [3] has recently been able to demonstrate specific agglutinins in the serum of rabbits inoculated with cultures of *Leishmania infantum* and *Leishmania canis*, but, so far, no opportunity has occurred to confirm these results.

Inoculations with Cultures.

In these experiments the method of intraperitoneal inoculation was solely employed.

Infection was produced in the grey monkey, *Lasiopyga callitrichus*, and the jerboa, *Jaculus gordoni*.

Negative results were obtained in two white mice, a pup and a wild cat, a guinea-pig and a domestic cat. Other animals that were inoculated unfortunately all succumbed the same day from heat stroke, and, owing to rapid post-mortem decomposition taking place, no satisfactory examinations of them could be carried out.

The monkey received on three different dates intraperitoneal inoculations with cultures of various ages. Eighty-eight days after the first inoculation it developed severe amœbic dysentery, but recovered without any specific treatment. It was killed on the one hundred and eighteenth day, and Leishman-Donovan bodies were only found in the bone-marrow. A careful

search of numerous smears taken from the spleen and liver was attended with negative results.

The pup used in these experiments was inoculated intraperitoneally with a heavily infected culture ten days old. This animal was killed one hundred and four days afterwards, but no evidence of Leishmania was present in smears from the liver, spleen, and bone-marrow.

Feeding Experiment with Fæces.

An experiment was carried out to note whether it was possible to infect a monkey by feeding it with the fæces of a patient suffering from kala azar. Two grammes of the patient's fæces were emulsified in normal saline solution and administered *per os* to a large healthy monkey, *L. callitrichus*. This was done on five different occasions at varying intervals. The animal was examined seventy-eight days after its first feed, and was found to be very anæmic and thin. It was killed on the eighty-sixth day without any evidence of Leishmania being present in its organs.

Feeding Experiments with Emulsions of Liver, Spleen, and Bone-marrow.

These were carried out with the object of noting whether infection by Leishmania could occur via the intestinal tract. In all cases healthy animals were used and, prior to the experiment, a liver puncture was carried out, and smears were prepared and examined so as to eliminate any possibility of a previous infection with Leishmania. The mouth of the animal was also carefully examined to note whether any abrasions were present. In the actual feeding experiments the procedure was as follows: The animal was firmly grasped with its head thrown back and its mouth held open. A saline solution of the infected material, either spleen, liver, or bone-marrow, was slowly pipetted on to the back of the animal's tongue. The act of swallowing was reflexly produced, and in no case was the infected material placed directly in contact with the teeth or gums. After the operation of feeding, the same procedure was repeated with 2 or 3 c.c. of sterile distilled water, so as to wash down all infected material into the stomach.

In the first of these feeding experiments a heavily infected spleen obtained from a monkey was emulsified, and given in the manner described above to a healthy monkey, *L. callitrichus*, which was kept isolated and away from any possible chance of infection.

Its fæces were examined daily. Thirty-one days afterwards this animal commenced to show signs of anæmia and emaciation. A liver puncture was carried out, but no Leishmania parasites were found. Examination of the peripheral blood showed that pathological changes were present, a few nucleated red blood cells being found.

Thirty-six days after the feeding experiment the animal appeared to be so weak, emaciated and anæmic that it was decided to kill it.

The spleen and liver were slightly congested but not enlarged, and the bone-marrow was red in colour. No lesions were apparent in the intestinal tract.

Smears from the liver, spleen, bone-marrow and heart's blood were made, and carefully examined, but no typical Leishmania parasites could be found. The peripheral blood showed normoblasts and numerous oval blue cells, some of which contained chromatin staining dots.

Owing to lack of suitable media no cultures could be made, but a healthy monkey, *L. callitrichus*, was inoculated intraperitoneally with 2 c.c. of an emulsion made from the spleen and liver of the fed monkey. The monkey was isolated and kept under observation. At the end of ninety days it was found to be showing signs of anæmia and was killed on the one hundred and twenty-third day after inoculation. Its spleen was enlarged and congested and somewhat firm in consistence. The liver showed evidence of congestion and the bone-marrow was red. Smears from the spleen and bone-marrow showed a fair number of typical Leishman-Donovan bodies free and phagocyted. The smears from the liver showed a fairly heavy infection with the same parasites.

This experiment points to the fact that the healthy monkey fed with kala azar material contracted the infection; but, owing to the short time that it lived after the experiment, few Leishman-Donovan bodies were present, and these were apparently missed in the post-mortem examination. That there was an infection, however, was shown by the results of the intraperitoneal inoculation carried out on a healthy monkey.

In a second feeding experiment the spleen from a fatal case of kala azar was minced up, and about five grammes administered *per os* to a healthy monkey, *L. callitrichus*. No apparent abrasions were present in the mouth. The animal was examined one hundred and thirty-two days afterwards, and found to be showing signs of anæmia and an enlarged spleen. A liver puncture was carried out,

and the smears made showed a fairly heavy infection with typical Leishmania parasites.

These two experiments have been considered worth recording, for, as far as the writer knows, they are the first instances in which a Leishmania infection has been produced by feeding animals with infected material.

A third feeding experiment was carried out with a healthy pup, the infected material being obtained from the liver and spleen of two inoculated monkeys. The animal was fed on two different occasions with an interval of forty-four days between each infected meal. Two months later the animal showed signs of anæmia and progressive emaciation. Repeated examinations of the blood eliminated the possibility of a piroplasmosis infection being present. The animal was killed one hundred and sixty-two days after the initial feed. The liver was congested and firm. The spleen was slightly enlarged and the bone-marrow reddish-yellow in colour. No definite Leishmania parasites were found in the spleen and bone-marrow. The liver showed oval and round cells about seven microns in diameter which contained "coccal bodies" identical with those described by Smallman [4] and myself [5] in certain cases of kala azar.

In a recent and somewhat critical paper Wenyon [6] refers to them and states that he has found these bodies in the livers of uninoculated dogs and rats, and therefore concludes that they are in no way connected with Leishmania.

It is strange that in the course of several hundred animal examinations carried out in the Sudan during the last six years one has not encountered these bodies in uninoculated animals.

Similar bodies have recently been observed by Chalmers in lung smears from a gerbil previously inoculated with a human strain of trypanosome and a homologous immune serum. They have also been recently obtained in liver smears from a soldier who was admitted to Kurmok Hospital during an outbreak of kala azar that occurred last autumn.

It is at present impossible to state their exact nature, but one is still inclined to consider them of protozoal origin, and in some way closely associated with Leishmania.

Feeding by Cultures.

A healthy pup was used for this experiment with the object of ascertaining whether the animal would develop infection. The same precautions were observed as in the previous feeding

experiments. The animal was fed on eight different occasions with strains of cultures obtained from kala azar cases. The cultures varied from eight to fifteen days old. Three months later the animal showed signs of anæmia. The peripheral blood and liver smears were carefully examined for evidence of *P. canis* but with negative results.

The animal lost weight but not to any marked extent. It was killed one hundred and forty-three days after the commencement of this experiment. The liver was congested and firm in consistence. The spleen was slightly congested but not enlarged. The bone-marrow was reddish-yellow in colour and the intestinal mucosa in the region of the jejunum was inflamed; no ulcers were present nor were any internal parasites found. Films from the heart's blood and smears from the liver, spleen, and bone-marrow were carefully examined, but with negative results as regards the finding of typical Leishmania parasites. The heart's blood showed normoblasts and marked vacuolation of the large mononuclear leucocytes. Many of these contained oval cells with chromatin, but the latter was not definitely differentiated into a tropho- and kineto-nucleus. The liver and bone-marrow also contained these cells. Whether they represented degenerated Leishmania parasites or not it is difficult to say. Cultures from the liver blood were inoculated into N.-M.-N. media and yielded negative results, and a monkey was also inoculated intraperitoneally with an emulsion of the dog's liver, spleen, and bone-marrow. Owing to the failure to find Leishmania parasites one can only conclude that the animal was either not infected or had so few parasites that they were difficult to find. The pathological changes present in the liver and spleen certainly suggested a Leishmania infection and not a piroplasmosis.

An attempt was made to establish infection *in vaginam* with a culture obtained from a case of kala azar. A healthy female monkey, *L. callitrichus*, was used. About 1 c.c. of a culture twelve days old was pipetted into the vagina, the mucous surface having been previously examined for absence of abrasions.

On the one hundred and tenth day the animal was killed, but no evidence of Leishmania infection was present, nor did parasites develop in cultures from the spleen and liver.

VACCINATION BY CULTURES.

For this experiment a healthy monkey, *L. callitrichus*, was used. The hair over the left shoulder and left leg was shaved off and the surface of the skin for an area of $\frac{3}{4}$ in. in diameter lightly scraped

so as to produce an abraded surface. A heavily-infected culture three days old obtained from an adult with kala azar was pipetted on to the surfaces of these abrasions and allowed to dry before the animal was replaced in its cage. The animal was carefully examined every week for evidence of any local condition developing over the vaccinated areas. On the one hundred and twenty-sixth day the animal was killed. No apparent skin lesions were present. Numerous smears from the liver, spleen, bone-marrow, endocardium and lung were examined, but with negative results. Culture tubes inoculated with material from the liver showed no evidence of a Leishmania infection.

Remarks on the Disease as met with in the Sudan.

On clinical grounds alone it is apparent that there are two types of the disease, an acute form which usually has a fatal result within a few weeks or months of the individual reporting sick, and a more chronic form in which the patient lives for a year or more without any apparent symptoms, the enlarged spleen containing Leishmania parasites being the only indication that the individual is affected with kala azar.

The acute type of the disease has been specially prevalent in the Sennar Province, where Marshall found it particularly among children of 12 years of age. In the neighbouring Province of Kassala, however, adults were more commonly affected. Speaking generally the disease appears to be equally prevalent among adults and children, and up to date there appear to be insufficient data to draw any material distinction between the varieties affecting the adult and the child.

The endemic areas of this disease have been mapped out by Bousfield [7], Thomson and Marshall [8], and broadly speaking correspond to the Kassala, Sennar and Blue Nile Districts. Since then, however, a case in an adult female has been found in Talodi, in South Western Sudan, and the evidence obtained shows that this woman contracted the infection in that district. Another probable centre of infection exists at Um Ruaba, a station two degrees north of Talodi and in the same province. This point is of epidemiological interest, for it gives support to the view that the disease existed in the west in the pre-Mahdi days, and may have been introduced to the Blue Nile and Kassala districts by the raids of the Baggara Arabs in the time of the Mahdi.

At Kurmok, an outstation on the Abyssinian frontier, there occurred a small outbreak of kala azar.

Nine cases occurred in the IVth company of the XIVth Sudanese between the middle of June and the middle of September of last year. The salient symptoms were cough and fever. Three of these cases had definitely enlarged spleens and three had enlarged livers. Six deaths occurred, and the remaining three were transferred to Khartoum. Two out of the three showed a heavy infection with Leishmania parasites, and the third patient, who arrived in Khartoum several months later, was kept under observation. His spleen and liver were enlarged, but he had no pyrexia. The spleen extended two fingers' breadth below the costal margin and was extremely firm in consistence. Splenic puncture was carried out with a small hypodermic syringe, but owing to the marked fibrosis which was apparently present, no material was obtained and in the interests of the patient it was not deemed advisable to carry out a second puncture. A liver puncture was performed; no Leishmania parasites were found, but, as already mentioned, cells containing the "coccal bodies" described by Smallman and myself were present. When seen two months later the spleen and liver had returned to normal size and the patient appeared to be perfectly well. His peripheral blood showed a definite eosinophilia.

This is the third occasion in which these bodies have been found in the Sudan and in all three instances the patients presented the clinical signs and symptoms of kala azar and recovered from the disease. Cultures of liver material from the third case were inoculated into an N.-M.-N. media, but no flagellates developed. A monkey was also inoculated intraperitoneally and is being kept under observation.

One of the two cases from Kurmok whose spleen showed a heavy infection with Leishmania was also found to be infected with a micro-filaria which morphologically and in other ways corresponded to *M. perstans*. Apparently, an infection with this parasite was compatible with a kala azar infection, and in no way interfered with the successful cultivation of the Leishmania parasites obtained by spleen puncture. This patient was treated by an autogenous vaccine prepared from the culture. After five injections the temperature, which had been fluctuating between 105° F. and 103° F. for several weeks came down by lysis, and the patient apparently showed temporary improvement, but the interstitial nephritis which had been a complication since the patient's arrival at Khartoum was followed by *cancrum oris* and death.

The other case from Kurmok had a very enlarged liver and spleen, associated with symptoms of diarrhœa. Spleen puncture

was carried out and a vaccine prepared from a six-day culture. Several injections of this vaccine were given. The patient certainly improved under the treatment. The diarrhœa ceased, the spleen and liver diminished in size, and the patient put on weight. Injections with a sensitized vaccine were also administered without untoward results. The patient is alive and well, although it is now eleven months since he was admitted into hospital. The spleen is still large but there is no pyrexia, and he appears to be in fairly good health.

There are not any new facts to bring forward with regard to the clinical features of the disease. In the Sudan, considerable difficulty is often experienced in diagnosing it from certain splenomegalies. As an aid to diagnosis one had hoped to obtain specific agglutinins in patients suffering from kala azar, but, as already stated, one failed to get any evidence of them.

The absence of coarse-grained eosinophile cells in the peripheral blood, together with an apparent leucopenia, has been found an aid to a tentative diagnosis, particularly in those instances where blood films are sent from an outstation. An idea of the patient's progress or otherwise may also be gauged by comparative differential leucocyte counts carried out at intervals, particular stress being laid on the percentage of eosinophiles present. It was interesting to note in two apparently recovered cases of kala azar the steady increase of the percentage of eosinophiles in the peripheral blood.

The Method of Transmission.—Since Patton's discovery of the development of the Leishman-Donovan parasite in the bed bug, *Cimex rotundatus*, the view that kala azar is a disease transmitted by some biting insect has been more or less generally accepted. Basile's experiments with the dog flea, *Ctenocephalus canis*, and the domestic flea, *Pulex irritans*, also lend additional support to this view, but confirmatory evidence is still wanting to definitely prove whether infection in man occurs in this way.

As regards the mode of transmission of the disease in the Sudan, one is not convinced that a biting insect plays a part. This statement is based on epidemiological and on a certain amount of experimental evidence.

The following facts do not appear to support the theory that the disease is conveyed by biting insects:—

(1) Sex incidence of the disease. In the Sudan the disease is extremely uncommon among the female population. Reference to the reports of the Commission will confirm this. Although most of the natives in the endemic areas are Mohammedans, the custom

of secluding the female is not carried out to such an extent as in Egypt, nor do they object to the medical examination of their women. Thomson makes reference to this in his report, and one's experience in some of these areas certainly agrees with his. The customs of the native women would certainly expose them more readily to the attacks of such biting insects as bed bugs, fleas, lice, and mosquitoes, for these are to be found in the dark huts which are usually occupied all day by the female element of the population. Their beds too are usually heavily infested with the bug, *C. lectularis*.

(2) As a rule only a single individual is attacked, the other members of the family occupying the same huts showing no signs of the disease. Such animals as dogs, cats, goats, sheep, hens and pigeons, which are also frequent occupants of these huts, have never been found infected. It is difficult to associate this fact with the theory that the disease is transmitted by a biting insect, particularly in view of the evidence brought forward by Marshall [9], who found that the parasite was present in the peripheral blood in 86·6 per cent of kala azar cases, and by Wenyon [10], who successfully cultivated the parasite from the peripheral blood.

(3) Since the disease has been investigated in the Sudan it has not been found in an epidemic form. This is contrary to what occurs in most diseases transmitted by biting insects.

(4) In experimental researches there has been no evidence to show the existence or development of Leishmania parasites in bed bugs, lice, and fleas fed on cases of kala azar in the Sudan, and one has failed to transmit the disease to susceptible animals by means of previously fed bed bugs and lice. Marshall also obtained negative results in his transmission experiments with the dog flea, *Ctenocephalus canis*.

(5) The destructive action of human blood serum on cultures of Leishmania. Although the experiments illustrating this point were carried out *in vitro*, they appeared to furnish presumptive evidence against the possibility of the cultural forms of Leishmania living after entering the human host *via* the skin.

(6) Failure to infect a susceptible animal, *L. callitrichus* monkey, by vaccinating it with a heavily infected culture of Leishmania.

Several experiments are now in hand to prove other facts connected with the transmission of kala azar; but sufficient evidence appears to have accumulated to justify investigations being carried out to ascertain whether the disease can be conveyed by the alimentary tract.

As already described, successful results have been obtained by feeding two animals with infected material and the question naturally arises as to the possibility of such a mode of infection in man.

As a result of a visit paid to some of the endemic areas in the months of May and June last year, one is now inclined to favour the theory that the disease may be produced by an infection of the intestinal tract.

For practical purposes the question of transmission by food need not be considered, but the probability of water being a means of carrying infection is worthy of study.

Bousfield, Thomson and Marshall found that the disease was more commonly present in villages situated near the river, but a few cases were also found inland in villages which depended on wells during the dry weather for their water supply. During and after the rains it is the custom of the natives to go in to the Khulla, i.e., the tracts of land outside their villages, to sow their crops, and it is at this season of the year that they consider they acquire the disease by sleeping on the ground and inhaling the vapours which arise from the warm moist earth. It is more probable, however, that infection may be obtained by drinking from the collections of water which accumulate in *khors* and in low-lying ground. Whether the parasite is obtained direct from the water or through some intermediate host such as a crustacean is a matter for conjecture.

If kala azar is a water-borne disease in the Sudan, why is it not more extensive in the endemic areas? As a possible solution one may bring forward the suggestion that in order for infection to occur in man some lesion in the intestinal tract must be present, such as is produced by an intestinal parasite or an entamœba.

Recently one has been carrying out a few examinations of a species of cyclops taken in the vicinity of Khartoum and found some interesting protozoal flagellates in their intestinal tract.

From observations already made one is inclined to consider the possibility of these water crustaceans being intermediate hosts for such protozoa as Entamœbæ and Trichomonas.

These views regarding the transmission of the disease are not quite in accordance with those of many other investigators, but they are at least based on observations recently made, and appear to justify the carrying out of further researches on different lines than has hitherto been done.

No natural host has been found among the numerous animals that have been examined. These include dogs, sheep, goats, chickens and cats. Last year when visiting infected centres particular attention was paid to the dog, but in spite of numerous post-mortem examinations of the spleen, liver, bone-marrow and nares no evidence of Leishmaniasis was found. Many of these animals looked ill and emaciated, but in almost every instance they were found to be suffering from piroplasmosis and many also showed microfilarial infections. Whether *Piroplasma canis* confers an immunity against kala azar or can occur as a concomitant infection has yet to be proved. Certainly the evidence up to date shows that the dog in the Sudan is not very susceptible to experimental infections, and therefore less likely to a natural one.

Among other animals that one examined with negative results may be mentioned the following: Squirrels, lizards, pigeons, bats, guinea-fowls, crocodiles, hyena, and various species of gazelle.

The main points in this paper may be briefly summarized :—

(1) Kala azar infections were produced by intraperitoneal inoculations in the following animals: Grey monkey, pup, jerboa, and gerbil, while guinea-pigs, rabbits, cats, kittens, pigeons and a cheetah failed to show infection.

(2) Experiments carried out with cultures of Leishmania-Donovani tend to show that the flagellates are possessed of considerable vitality, and when exposed to unfavourable conditions short of immediate death revert to a cystic stage.

(3) Human blood serum has an almost immediate destructive effect on cultures of Leishmania-Donovani.

(4) Specific agglutinins are not present in the serum of patients suffering from kala azar.

(5) Kala azar may occur as a concomitant infection with filariasis.

(6) Intraperitoneal inoculations with cultures produced infection in the grey monkey and the jerboa but failed to produce infection in white mice, a pup, a wild cat, a guinea-pig and a domestic cat.

(7) A susceptible animal fed with the fæces of a case of kala azar failed to contract infection.

(8) Infection was established on two different occasions by feeding grey monkeys with infected material containing kala azar parasites.

(9) Cultures introduced *in vaginam* of a healthy female monkey failed to produce the disease.

(10) Vaccinations with cultures failed to produce infection in a grey monkey.

(11) Epidemiological and experimental evidence does not support the theory that kala azar in the Sudan is transmitted by a biting insect. A more probable source of infection appears to be some intermediate host whose habitat is in water.

(12) No natural host has been found among the numerous animals examined in the Sudan.

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MALE AND FEMALE.

By Colonel R. H. FIRTH.

Probably, upon no class of educated man does a greater responsibility rest to have a clear insight into the facts, to hold definite ideas upon, and to be able to express his views and arguments concerning the social problem of sex, than the doctor. As a man of the world, meeting men and women of all ranks in life who appeal to one for expressions of opinion, the need for a critical analysis of a present-day problem has frequently been very forcibly brought home. We, as Army doctors, hold a peculiar position, and the need for us to be able to hold our own in society when these matters are under discussion appears to me to call for serious and matured reflection. The condition of unrest between the sexes which permeates society at the present time is well known to all, and, as an attempt to analyse the question from the scientific standpoint, I venture to put forward some considerations which may be of value to others. In so doing, one disclaims any wish to speak dogmatically or to discuss economic and political aspects. One's attitude is entirely that of detachment, or rather that of the thoughtful student approaching the subject from the biological and ethnological side. How far one's arguments may carry weight, rests with the reader.

I.

To me, and to many others reared in the old traditions, the development of a sex war has seemed incredible. Still, the fact is unmistakable, and it behoves us to examine the question. The differentiation of living matter into male and female was one of the earliest effects of biological law, and, though environment may have influenced the ease with which these functions were exercised, any failure by either sex to discharge them must derange drastically all other bodily functions of a bi-sexual species and lead ultimately to its extinction as such. It follows from this fact that no human being can escape from the results of the infringement of the biological law of sex, and any attempts on the part of human law to regulate the external relations of the sexes must conform to biological law, if it is to remain stable. There appears to be a tendency at the present time to ignore these elementary facts, and the apparent ignorance of them is traceable to the mysticism which

has enveloped woman during the whole course of her progress from puberty to maternity. This mysticism has been encouraged by women themselves, and the great difficulty for a man is to understand the impulses of woman, the effect upon her actions, and the true nature of her needs and difficulties. We arrive, therefore, at the fact that society is compounded of two fundamentally different elements, and the power and effect of only one of these elements are, as a rule, seriously considered by sociologists. The vast majority of sociologists have been and are men, consequently we find the problem of the sexes examined and approached entirely from the male side, or by that element notoriously incapable of analysing the mental attitude of, or the influences affecting, the other and female element. Therefore, in dealing with this question, we must consider not the male but the female mind and, more particularly, the female aspect of reproductive physiology and psychology.

The least informed student knows that the digestive and the reproductive are the two earliest systems of organs possessed by all living things; the one necessary for the life, and the other for the continuation of the species. Of the two, the reproductive is not only structurally but functionally and fundamentally different in the male and female; and since all the other organs are affected by this reproductive system, it follows that the male and female are essentially different throughout. Some of their differences are glaring, others are obscure or subtle, but the most remarkable of them are dependent on profound divergence of function. What the forces are which induce the activity of the reproductive system, or give rise to the products of that activity we have little knowledge, but clearly the origin of the stimulus is the same for both sexes, though the functional effects are expressed differently in the male and female of all animals. Among the lower species, forceful sex influences are specially marked in the male during the breeding season, and in the female during pregnancy. The differences between the sexes is not confined altogether to these brief periods and, as we advance in the scale, they act always with greater force, are accentuated by social necessities or laws, and emphasize the essentially separate nature of the two sexes. Moreover, it seems certain that the actual influence of the female is in direct proportion to the secrecy with which her characteristic differences are guarded. Whether we examine the conditions of primitive or civilized life; we find these sexual differences manifest; civilization has doubtless given rise to delicate shades of divergence but, throughout all the animal world, the main functions of the one sex

are at once complementary and opposed to those of the other. It is to these inherent functional differences that many of the misunderstandings common between men and women are due; they may be regarded as not necessarily wilful but inherent. For example, it is not uncommon for the woman, once children are produced, to have but a secondary liking for the man, and rather desire unfettered freedom to rear the young ones. The male occupies, then, but a subordinate place in the life work of the female and, from a sexual point of view, is but a nuisance to her. Such a feeling is to be found frequently among women, though they themselves do not recognize the force which is driving them from within. In some primitive life conditions, the male will regard the female primarily from a sexual point of view or perhaps as a mere worker for his benefit, and when, either temporarily or permanently, she fails to attract him he will seek another to take her place. These instinctive desires are a quality of sex, or to put it in another way, love for one woman is not destroyed by passion for another. Society and expediency may hold that constancy is the sole gauge of love, but the two are naturally distinct, and it is only in the higher civilizations, or under the action of ethical laws, that the two are merged together. Thus, it is not only the male and female outlook on life which is different, but the woman's biological necessities and all the forces which conduce to their satisfaction are so dominant, that the differences between male and female are exaggerated. Any fixing of the precise nature of the constitutional differences between the two sexes may be impossible; yet, broadly speaking, we can say that the female, as the giver and keeper of life, is relatively more constructive and relatively less disruptive than the male. The evident differences between the sexes must be and are due to the saturating influence of sex on woman's mind, this takes the form of a deep lying distinction based on the essential fact of her womanhood, her capacity for maternity. Women are more sensitive to suggestion and receptive of outward influences; they are more emotional and, within certain limits, more imaginative than men. The curious way in which woman can be influenced by religious suggestion is similar in its nature to that saturation of her innermost thoughts with love, which again is largely due to an over-emphasized sexuality produced in her by an artificial existence and limited environment. Thus, it comes about that the true distinction between the psychology of woman and man is as the difference between feeling and thought. Woman thinks through her emotions, man feels through his brain.

This may be an exaggerated statement, but it is not inconsistent with what may be accepted as a truth, or that each sex contributes to the thought power of the other, each being indispensable to the other as much on the mental plane as on the physical. As helpful to a better grasp of this complex question of sex antagonism it is convenient to examine the problem biologically and historically.

II.

As a general proposition, it may be laid down that among the higher forms of life the males are usually larger and stronger, more structurally varied and more adorned than the females. In the human, these differences persist and exist, but find expression in a greater number of less strongly marked physical, psychical and mental characters. From these facts, it is easy to see how the widely held opinion of the superiority of the male and the sacrificing of the female to the reproductive process has gained dominant currency. If this prevalent view be correct, the question of woman's place in life would be settled; but we men have to be sure that it is correct, and a little inquiry forces the conclusion that it is but a half truth. An elementary examination of the humblest forms of life brings home to us the fact that the female is of more importance than the male from Nature's point of view. Asexual reproduction is essentially a female process, and the advent of the male cell in evolution is suggestive of an auxiliary development of the female, or, as Ward puts it, "an afterthought of Nature devised for the advantage of having a second sex." Further, among such groups as the rotifers, the cirripedes and nematodes, the males are not only relatively small, but in many cases mere parasitic fertilizers. The existence of these helpless little husbands finds its present-day representative among humans, and serves to show the true origin of the male as something called into being by the female to be of use in the life scheme, to help her in producing fitter forms. On the other hand, exceptions occur where it is the female who becomes passive and dependent; thus, in the thread worm on turnips, the cochineal insect, and in certain ticks, there is a more or less complete form of female parasitism. All these are extreme examples, arising out of conditions under which the species live, but there is little or no doubt that up to the level of the amphibians, female superiority in size and often in functional power prevails. Even among mammals, practically all the great

family of rodents show males somewhat smaller in size and strength to the females, and very little difference in colour and ornamentation. Perhaps the birds, in whom the sex instinct has attained the highest and most æsthetic expression, are the most suggestive of this matter of female superiority, as nearly all the hawks, falcons, eagles, harriers, buzzards, owls, curlews, dunlins and godwits, present examples where the female bird is larger than the male and equal to him in ornament and in colour.

Apart from mere morphology, we find a study of lower life forms instructive as to courtship and love, which demonstrative phases are the key to the evolution of the sexual passion, or that process which led to the creation of the male by the love-choice of the female. In the most primitive type of sexuality, where two cells flow together to continue life, we find the bedrock of love, or simple cell-hunger. Even this primitive sex-appetite was not purposive, but acted subconsciously by an interaction between the need of the organism and its power of function. In plain words, we premise the existence of a psychic interest preceding the sex act, foreshadowing a higher grade when the presence of one sex attracts the other and the gradual association of male and female into pairs. Anyone who knows anything about fishes, such as salmon, realizes the marked court paid by the male to the female, and how he is her faithful attendant during the breeding season, fertilizing the deposited ova in her presence. More than this, he is her jealous guardian, fighting other males fiercely. The same thing goes on among other fishes, like the sticklebacks, who at the breeding season assume brilliant colours and woo the females with passionate movements; much the same is to be seen among snakes and lizards. Even the octopus pursues a courtship of the utmost delicacy, the male stretching out an arm and caressing the female with its extremity and passing it eventually into the chamber formed by the mantle. During these acts, the female contracts spasmodically, but does not attempt to move. These interesting signs of primitive courtship and love can be amplified by the love antics of birds, the newts, the frogs, the beetles, and all the host of moths and butterflies. These movements show us clearly the origin of our sex passion from simple cell-hunger, and the higher we ascend in the animal scale the stronger does the sex-appetite become; it proves that the love process throughout all kinds of life is identical with our own, and that any negation or suppression of the instinct is not in accord with the laws of nature. I am writing this at a time when the breeding of birds is in full swing

at Peshawar, and outside my window now is a pair of mynas performing love antics of bowings, struttings, and gentle chucklings that are as beautiful as they are suggestive. One sees and realizes how a simple impelling cell-hunger drives the male and female to unite; in plain language, one sees that life knows no development except through love, and that, all around one, Nature is producing great effects by simple causes, and the female responding to the right male. One has laid stress upon these examples from Nature, as they point to an important generalization which touches the kernel of the whole question under consideration. It is, that the condition of female dominancy with which the sex impulse or sexuality began has in this connection persisted. From the very beginning, Nature has made use of the male to assist the female to carry on life; in all cases, the female is the pursuer and the male the pursued. This superiority or dominancy of the female in the sexual relationship constitutes a very strong reason that women be granted their claim for so-called emancipation, or relief from certain present-day disabilities connected with the married state.

Arising from the development of the love process is the development of the social as opposed to the individualistic life. The individual, as primarily the host and servant of the seed of life, exists only for the race, and from this dedication of the individual to the future, arise the family and the home. None but the blind can fail to see a rough but clear outline of society throughout the animal world, brought primarily into being by the play of sex instincts overmastering and directing the hunger instinct for food. If we turn to man, we find the same domination of sex-needs, but sex raised to a plane of self-consciousness, because man and woman not only love but know they love. In these matters, the human being is not only motived by instinct, but is guided necessarily by inborn, acquired and conflicting forces. Hence arose the human need for sexual variety, with a constant tendency towards licence; and while the elaborate phenomena of sex among animals and insects have for their end the reproduction of species, they operate in man, both physically and psychically, on the person or individual. The recognition of this personal end of human passion is of importance as affecting the bigger question of present-day sex warfare. From the biological side, we arrive then at this conclusion, that the male at first was an insignificant attendant on the female; then, the long evolution of selection by love, coupled with economic and martial activities, brought about a reversal of the early

superiority of the female by a process of aggrandizement of the male. Among the invertebrates some constancy of female superiority is still manifest, and this persists in some vertebrate types, notably the birds. Further, it is apparent that any extravagant development of the secondary sexual characters is unfavourable to the reproductive process, as the males among the carnivora, deer, buffaloes, sheep, goats, pheasants, pea-fowl, turkey-fowl and poultry are all bad fathers; also, that the more oppressed the female is the more faithful mate is she to the male; similarly, the highest expressions of love, as seen among the birds, are associated with a maintenance of essential sex distinctions concurrent with an evident high individuality in the female, and an equality in all respects with the male.

III.

We may now approach the question from the ethnological and historical sides, and see how the human past throws light upon the position of the sexes. In the immediately post-simian phase of man it is probable that there was no sense of kinship and no permanent family grouping. Certain extant but primitive peoples show this in our own day in Borneo and Terra del Fuego. From the scattered herds grew the organized tribal group centring round the mother and children; relationship counted only through the female, the male being unindividualized as husband or father, and holding no position or rights in the group of females and children. Gradually the forceful male asserted himself mainly by male relations of the female, and endogamy gave place to exogamy, with the husband and father still subordinate and under his children's maternal uncle. At this stage maternal descent was dominant, and the female the transmitter of property. The whole of folk lore, fables, and the Bible are full of this important fact that mother-right or womb-kinship preceded father-right, and was a stage in social evolution for all early branches of the human family. It was characterized by great freedom for women, often a free choice of mate, and associated largely with polyandry, especially fraternal. Some modern survivals of this stage are met with among the Thibetans, the Santals of Bengal and Orissa, and among the Todas of the Nilgiris, in whose language there is no word for adultery, and immorality attaches rather to him who grudges his wife to another man. Similarly, among the Nayars of

the Malabar coast the husband cannot sit among his children in the presence of his wife. The male is a mere progenitor, and no Nayar knows his father; it is very similar among the Malays of Sumatra. Africa also is full of corresponding customs, emphasizing the existence of mother descent and the dominancy of the female in the social scheme.

The general and gradual reversal of these matriarchal customs among peoples, leading up to definite father descent and dominancy of the male in the social groupings, must be attributed to the male asserting himself by capture of wives and giving these wives a more individual interest in himself and his protective ability. Moreover, women so captured and established in the home appreciated naturally the change to a one-man subjection from a subjection to all their male relations; in other words, there resulted a change due partly to the interests of the husband and partly to the inclination of the wife. Possibly this latter factor was the more potent influence, for it voiced the desire of the female for a closer and individual interest or relationship with the father of her children. The father's right in his children followed naturally, and the family concept developed as we understand it now. All these changes were gradual, and involved stages when the females, who originally had been dominant, became slaves. Even in these times whole people exist where such is the case.

It is worth while seeing how far the foregoing outline of the evolution of the family and the relative position of the male and female is corroborated or negatived by some earlier civilizations. The oldest is that of Egypt. There, nearly 4,000 years before Christ, we find the females endowed with remarkable freedom, and on perfect equality with the male. The head of the family was the mother, and the transmission of property went through the female. Many of their marriage contracts have been deciphered, showing that there was sale of the bride, but the price went to her, and that and other property was at her disposal. Marriage among those people was a matter of mutual agreement by contract; little regard was paid to pre-nuptial chastity for women, and illegitimacy was unrecognized, even the child of a slave woman being legitimate, and any and every mother of a child had an official and recognized claim for some kind of provision at the father's expense. Throughout all the Egyptian laws and customs is traceable the principle that the rights of a mother have first call upon the male; also through the long centuries of their civilization, the Egyptians devoted their energies to the building up of the family life and

domestic administration on the fundamental principle of full equality in all things between the sexes, and that domestic authority is sustainable only by mutual respect and affection between male and female. Of all peoples, the old Egyptian alone seems to have solved the sex problem.

Judging by the deciphered texts from Babylon, the female was in high estate under the Assyrian civilization, for in all invocations the goddess comes before the god. Their idiograms for family and mother were "children-household" and "god-house." The few facts that are available show clearly that in the earliest times a Babylonian woman had full equality with man, enjoying complete independence and equal rights with her husband and brother. In later stages of Assyrian history, with the rise of military activities when the male came into prominence, the female fell to an inferior position in the family, involving some circumscription of the woman's rights, but no loss of civic equality. Taking the Assyrian civilization generally, it may be inferred that the position of the female was probably less advanced, free and enlightened, as compared with the female status in the land of the Pharaohs, but all the same many degrees above servitude.

In the later civilizations of Greece and Rome we find some variation in the position of the female. The Homeric period was characterized by considerable freedom for the woman, and mother rights were dominant. The Iliad and the Odyssey present abundant evidence that woman was held in deep affection and great honour. We recall the stories of Penelope and Clytemnestra, of Helen of Troy, of Chloris, queen of Pylos, of Arete, wife of Alcinous, and of Nausicaa, bringing Ulysses to kneel to her mother if he would gain a welcome and help from her father. Later, we find Aristotle warning the young Athenians against undue tenderness and wife tyranny. Possibly his words but anticipate the stereotyped attitude which we know prevailed later in Athens, where the females were condemned to an almost oriental seclusion. The Athenian woman was under strict subordination to both father and husband. She received no education, and there is a total absence in Athenian literature of signs of any general affection between husbands and wives. Those who remember the Antigone of Sophocles will detect at once the degraded status of women in his day. The debased condition of the Athenian women is reflected in the satires of Aristophanes, and nowhere better than in the pathetic lines of the "Medea" of Euripides, where the dramatist makes the women say:

"Of all things upon earth that breathe and grow
A herb most bruised is woman. We must pay
Our store of gold, hoarded for that one day
To buy us some man's love, and lo, they bring
A Master of our flesh. There comes the sting
Of the whole shame, and then the jeopardy
For good or ill, what shall that Master be?
Reject she cannot, and if she but stays
His suit, 'tis shame on all that woman's days.

. . . . .
. . . . .

And then, forsooth, 'tis they that face the call
Of war, while we sit sheltered, hid from all
Peril. False mocking. Sooner would I stand
Three times to face their battles, shield in hand,
Than bear our child."

As a matter of fact, it would seem that to the Athenian male the only chance of ideal love and free relationship between the sexes, under the system under which he existed, was with the *hetairæ* or the stranger women of the town who, free in other respects, were forbidden legal marriage. These women were the only educated females in Athens, and in much demand as intellectual associates. Pindar wrote an ode to them, and Praxiteles carved a statue in gold of Phryne one of the *hetairæ*, and the work stood in such honour that it was placed in the temple of Apollo at Delphi. Pericles chose Thagalia, a Milesian, as a medium for conversing with Socrates, and we know that philosopher favoured the company of Diotima and Theodota. The high status of the *hetairæ* is pressed on us when we find one of them, namely, Aspasia of Miletus, the boon companion of such men as Sophocles, Socrates, Euripides, Phidias and Anaxagoras. She was cultured, and the evident spokeswoman of her sex against the current status of woman in her time, for Plato, who knew her, says of her "the gifts of Nature are diffused equally in both sexes." He saw clearly the loss to the State by the wastage of Athenian mothers arising from enforced restriction within the home and neglect of their education. The picture of Athens in that day is before us now in the present time condition of Indian women.

The contrast is great, when we look to Sparta, that other state of historical Greece. There, the social organization was essentially male, but the females were free, cultured, athletic, and trained on precisely similar lines to the males. Sappho was an Æolian, and the gem of Spartan womanhood. Sparta held a precarious existence, and needed a race of vigorous males for soldiers. Her leaders

recognized the need for vigorous mothers; it was on this sentiment or policy that Lycurgus drew up his code, whereby marriage, like military service, was obligatory, and celibates placed under a ban. In the supreme interest of the race love was regulated, so much so, that each child born was the State's and, if unhealthy, was killed; moreover, it was praiseworthy for an old man to give his wife to a strong man by whom she might bear a child. In spite of certain demerits, the Spartan code gave the State a fine race, and it was by them that the State held its own. We recognize the spirit of the people in the words of the wife of Leonidas, whom Plutarch, in his "Life of Agis," records as having said: "We are the only women who bring forth men."

If we recall Roman history, we find the position of the female to have been good on the whole. In the earlier years, the transference of the woman into the *manus* of the husband, under the law of *usus*, gave her no rights except through him, and no duties except to him. The right of *manus* gave the husband complete power of correction over the wife, including the right of life or death to her and the children. Later years saw a revolt of woman against the system, and marriage was expanded by a modification of the *usus*, known as *conventio in manus*, whereby the wife, by passing three nights in the year out of the conjugal domicile, was able to break through the terrible right of the husband's *manus*, and the female was no longer the property of the male. This form of free marriage, largely by consent, replaced rapidly the *coemptio* or purchase form, and the religious *confarreatio* as practised among the patricians. The laxer form of marriage made the bride a member of her own family, gave her complete control over her own property, and generally enabled her to be her own mistress. Divorce became easier, and the law evolved the rule that the male had no right to demand fidelity from the female unless he practised the same himself. Under this system of complete equality with man, the Roman matron played a big part in society and the State. At the dissolution of the Roman empire, the humane and civilizing influence of the old Roman law was affected by fusion with barbarian customs and the influence of the Jewish marriage system, resulting in the giving of rights to the husband in marriage and divorce which were denied to the wife. In the twelfth century, the influence of Christian dogma and the establishment of canon law involved an increased contempt on all love outside legal marriage, and the old Egyptian and Roman view of marriage as a contract between male and female, having equal civic rights,

became lost. For many generations the position of woman in Europe suffered consequently.

IV.

A review of the evidence which has been advanced brings us to the conclusion that, like all other attributes of being, sex has emerged gradually, or rather has discovered itself and its nature very gradually. During the pre-human epochs its significance was clouded, appearing only as a simple means for reproduction. Among the simians, we conceive it as attaining a quality indicative dimly of something more, but it was not until self-conscious man evolved that the distinction between male and female revealed itself as a great fact of existence, and as something apart from its reproductive function. Biology shows all nature as divided into two halves, and these halves by virtue of their distinctiveness are pulled together by a constant and irresistible attraction. Upon that mysterious attraction depends the whole process of evolution. As beings subject to sex, we find it difficult to appreciate the paradox which it presents. Under its domination, we are so influenced by an instinctive attraction to the unlike that we are revolted by the very thought of any attraction of the like to the like. Sex, or maleness and femaleness, is thus at once the greatest dividing fact and the greatest uniting force, and the whole scheme of Nature is revealed as a gigantic synthesis, through the attraction of unlike to like. It is true many people in the world regard their personal servitude to this force as something to be ashamed of, and the winding of cloaks of shame or pretence about themselves to keep at bay the small knowledge of themselves that they possess already, is the origin of the misogynist and the extreme type of man-hater among women.

In attempting to unravel this tangle of the sexes, we are faced with the basic fact that there is a fundamental difference between male and female. The question we have to ask ourselves is : Is any difference which we find between the sexes due to a natural, unalterable inborn quality of woman, or is it an acquired modification that has been forced or imposed upon her through the artificial, sexual, social and economic circumstances of her environment? From the biological and historical standpoint, it would seem that any present social inferiority of woman is mainly acquired, due to her adaptation to an arbitrary environment. It is palpable that the male, in our social organization, by supporting the female has

become her economic environment, and it follows that by her economic dependence in the sex relation, sex distinction among us has become for the female not only a means of attracting a mate, as common to all the animal world, but a means of gaining a livelihood, as is the case with no other creature known to us. This may seem a very bald statement of the situation but, in honesty, we must admit its truth, and, moreover, it is the pivot on which turns the present-day sex-war. From the brief review one has made of the great civilizations of the past, we realize that morality and sexual customs or institutions are not fixed, but peculiar to each age, and commendable only so far as they fulfil the special stage of a people's growth. We have seen that woman made special contributions to early civilization, and we find reasons why she has lost her former position of power. The reasons may be put thus: the work of the world falls into two parts, the militant and the passive. The militant side of social activities has passed gradually to the male, and the dominancy of that sex has been stimulated into growth by the conditions and struggle for existence. Because of the greater range of his activities and opportunities, the male has developed a superior fitness. The female, for generations, has not had an equal part, and her passivity has acted as a drag upon her development. The evolution and sequence of developments of the sexual relation has been natural, and the separation of the social activities of the females and the males cannot be laid to any so-called injustice of men to women. The great factor which has been at work to delay woman's emancipation has been woman herself, and woman is what she is simply because she has lived as she has lived. One writes this as a man trying to hold the balance evenly, and to do so is the plain duty of every man, if he is to appraise at its proper value and see in proper perspective the present-day revolt of woman. How far she is justified in that revolt must be left to the judgment of each one of us, but as professional men we are compelled to think over the case and, moreover, mature our judgment, ever mindful of the question: Will change work for the benefit of the future race? It interests us only from that point of view.

One's article would be incomplete if left at this stage. To say more means some expression of one's own formed views and judgment, and perhaps the laying of oneself open to the criticism that one is forcing personal views on others. Such is not the object of this review; its main purpose is to get others to think, and it must be accepted as it is offered, a mere study suggesting thought

reflection and judgment from the reader, who must think for himself. In forming a personal judgment on the question, one is influenced solely by equity and eugenics or race betterment; such judgment finds expression in the three following conclusions: (1) Woman is the guardian of the race by virtue of her reproduction function, and in consequence of that she owes a paramount duty to society; (2) woman must no longer follow man, but be responsible to herself; (3) woman must be freed as woman, that is not free from man, but free with man. These may appear advanced and startling conclusions, but they are consistent with the facts. These facts are, that the female was the active agent in the start of life, and woman is the main stream of its force; the male is merely her agent and helper in the matter, and it follows that woman is the predominant partner in the scheme of sexual relationship. The acceptation of these conclusions involves, further, the recognition by both sexes of the first function of femaleness to be reproduction, and that to place the future of the race upon a sound basis the female must be equal with the male both as to choice of mate and the rights associated with conjugation, separation, and the education of children. We have to break away from the conventional dominancy of economic considerations in the love process, giving the female free scope for exercising her faculties of discrimination in the selection of the fittest man; the recognition of this principle is vital to race betterment and minimizes the existing danger arising from females marrying the old, the unfit, and diseased merely for maintenance and a home.

Evolution on these lines means an abandonment, on the part of the male, of the view that the sole value of the female is her sexuality; it means also an honest recognition by the male of civic equality of the female with himself. By the female, the greater effort will have to be made. She must pay a price for her free womanhood, and that price is, she must cease to profit and live by her sex, but step down into the arena and be a plain woman among plain men, training herself to keep pace with man, at the same time loving gladly, and bringing forth children without shame. One conceives sex freed from all unworthy necessities, courtship or selection of mate regarded as a serious opening in the drama of life and not a game of chance so far as the future race is concerned. The problems of love are so closely linked to the needs of the race, that both equity and eugenics demand that the female have an equal share or choice with the male as to what is to be the standard of that race. The present-day sex-war is essentially a question of

woman's consciousness of her false position, and a realization of her nature. As men we must admit that, as the producers of our children, woman is the dominant director of love's selection power and entitled to full equality with ourselves in the framing of the codes which control and guide the relations of the sexes. This is the alpha and the omega of the whole problem, and the female's assertion of her so-called rights and equal responsibilities with the male is but an affirmation of rather than an ignoring of sex, having its real cause in the needs of the race and woman's sense of her potentiality for motherhood. To concede the claim seems likely to be our gain rather than our loss, for it means civic equality between the sexes, a better blending of specific differences and resemblances in the sexes, the better dwelling together in unity of male and female, and the evolution of the perfected man and the perfected woman. Given these results, we secure all that equity and eugenics demand.

INTRAVENOUS INJECTION OF NEO-SALVARSAN IN CONCENTRATED SOLUTION.

By Brevet-Colonel T. W. GIBBARD, K.H.S.
Royal Army Medical Corps.

When given intravenously, it is usual to dissolve neo-salvarsan in 0·4 per cent saline solution at room temperature, freshly distilled water and chemically pure sodium chloride being used in the preparation of the saline solution, of which at least 25 c.c. is used for each 0·15 grm. of the drug, that is 150 or 200 c.c. for 0·9 grm. But neo-salvarsan may also be administered intravenously in concentrated solution, 0·45 to 0·9 grm. dissolved in 10 c.c. of sterile distilled water. To further simplify the procedure, I have lately been using 10 c.c. of boiled tap water instead of distilled water, and this it would appear can safely be done provided the water does not contain too large a quantity of mineral salts.

Considering the simplicity of the procedure and the saving in time, stills, etc., it may be useful to describe the technique.

Neo-salvarsan is readily soluble in water, forming a neutral solution, the addition of an alkali therefore being unnecessary. It quickly oxidizes when exposed to air, hence the tube containing it should not be opened until everything else is ready, and when dissolved the solution should be injected at once. It oxidizes into a highly toxic compound when exposed to heat; the temperature of the fluid in which it is dissolved should not be above 70° F., and the syringe used for the injection must be allowed to cool, after sterilizing, before the solution is drawn into it.

Apparatus, etc., required.

(1) Test tube, (2) a 2 oz. Jena glass beaker (or a porcelain crucible) marked at 10 c.c., (3) a 10 c.c. syringe with needle, (4) solution of iodine in chloroform (1 in 15), (5) torniquet, (6) gauze and collodion.

As regards the above, it may be remarked that a small glass beaker in which to dissolve the powder is preferable to a porcelain crucible, the former rendering it easier to see that the solution is clear. A Record syringe is suitable. The 1¼ in. platino-iridium needle supplied with the all-glass syringe used for intramuscular injections of mercury is preferable to that supplied with the Record syringe.

Preparation of Apparatus and Solutions.

(1) Sterilize the syringe by boiling, and place it in sterile water to cool; the metal portion retains the heat for some minutes. When there are several cases for injection, use two syringes, one being boiled and cooled whilst the other is in use.

(2) Sterilize the needle by standing in absolute alcohol; remove from the alcohol and place in sterile cold water ready for use. If sterilized by boiling, the point will require frequent attention.

(3) Boil a test-tube of tap water and cool it to below 70° F. When cool pour this into the Jena glass beaker up to the 10 c.c. mark.

(4) Open a capsule containing neo-salvarsan, slowly pour the powder into the water and dissolve it completely, using the small glass rod provided with each ampule; the rod should previously be sterilized by boiling.

Technique of Injection.

Draw the solution of neo-salvarsan into the syringe with the needle attached, expel air, detach the needle and place it in sterile water.

The patient lies on an operating table or in bed. A tourniquet is applied round the upper arm, the veins distended, the fist being opened and closed firmly several times. A prominent vein is painted with iodine solution; the skin over the vein is picked up, the needle inserted into the tissue between it and the vein and then into the vein. Some push the needle through the skin directly into the vein; the procedure described above is, however, that which I have found the best.

When the flow of venous blood shows that the needle is in the vein the syringe containing the solution of neo-salvarsan is attached, the torniquet removed, and the patient directed to quietly open his hand; the solution is then slowly injected, care being taken not to displace the needle from the vein. Whilst injecting the fluid watch carefully for infiltration; should this occur, stop at once, remove the needle, seal the vein by pressure, and put the needle into another vein. On completion of the injection the vein is sealed by pressure, and collodion and gauze are applied.

The above is the procedure used when the veins are small, and which I advise beginners to adopt in order to avoid infiltrates. In the case of good veins the needle may be inserted whilst attached to the syringe; when this is done it is advisable to momentarily

detach the syringe to see that venous blood is flowing, then attach it again and complete the injection. In some cases the fact that the needle is in the vein will be obvious by the back flow of blood into the syringe. With experience the operator will seldom find it necessary to detach the syringe.

The question whether neo-salvarsan is as active therapeutically as salvarsan is still undecided. Our impression is that when used in the treatment of syphilis more frequent doses are necessary than when salvarsan is used. Whether this is correct or not, can only be ascertained by careful investigation, and this we had commenced when war was declared, but have been obliged to discontinue it for the time being.

Reaction following concentrated injections is trivial, though possibly somewhat more frequent than when freely diluted solutions are used. Out of 50 cases in which 0·45 grm. neo-salvarsan dissolved in 10 c.c. of boiled tap water was injected, only 3 had a rise of temperature of 100° F. or over. Of 51 cases in which 0·9 grm. in 10 c.c. was injected, 13 had a temperature of 100° F. or over, in 8 cases a rigor occurred, and in several others slight vomiting and diarrhœa. None had a rise of temperature or other symptoms the day after the injection, from which it would appear that it is not necessary to detain such cases in hospital the day after injection.

A REPORT ON GAS GANGRENE.

By Colonel Sir ANTHONY A. BOWLBY, C.M.G.,

AND

Lieutenant S. ROWLAND.

Royal Army Medical Corps.

It seems advisable to record briefly the conclusions at which we have so far arrived on the spreading gangrene which has occurred amongst the wounded of all the armies now in France.

One of us (S. R.) has examined the condition bacteriologically, and this examination was carried out in the "Mobile Field Laboratory." Iu a typical case affecting the hand, a bacillus was found which was isolated for examination. A culture of this, when inoculated into a guinea-pig, caused its death in eighteen hours. Post-mortem there was found a gangrenous cellulitis from which the inoculated organism was recovered. A second guinea-pig inoculated from this culture was sent to the Lister Institute. It arrived safely and died within a few hours of its arrival, thus affording abundance of fresh material for a more detailed examination than was possible under field conditions. An examination of the culture was meanwhile made in the field laboratory, and the conclusion arrived at was that it was probably the specific organism of malignant œdema. Further examination made at the Lister Institute by Dr. C. J. Martin, F.R.S., and Dr. Arkwright inclined these observers to the view that the organism in question was identical with one that for some time was confused with that of malignant œdema, known as the bacillus of Ghon and Sach. This organism was originally obtained from a case of gangrene in the human subject. There are some ten different organisms that have been isolated from cases of gas gangrene in man, all of which are closely allied and have the common characteristic of being anaerobic spore bearers. From other cases in the clearing hospitals at the front several more organisms of this group have been isolated and have been sent to the Lister Institute for confirmatory diagnosis.

A sample of earth from a trench was also examined. The inoculation of a few drops of water, in which this earth had been shaken up, into a guinea-pig, killed the animal in eighteen hours. Post-mortem, a similar gangrenous cellulitis was found. The animal was also found, like the guinea-pig inoculated from the gangrenous hand culture, to be infected throughout with a spore-

bearing anaerobic organism belonging to the same group. It is reasonable to conclude, therefore, that the gangrene found amongst our wounded soldiers is directly due to infection introduced at the time of the wound, and this is especially likely to occur if muddy clothing has been carried in by the projectile or if earth has been carried in by the explosion. We are, therefore, of the opinion that the gangrene that occurs amongst the wounded is a "traumatic infection," and dates from the moment of the injury. It is solely due to infection from the soil, and is in no way related to sloughing phagedena, or so-called "hospital gangrene."

Clinical Picture of Gas Gangrene.—In the cases we have seen the gangrene has always occurred in connexion with wounds of the extremities. We have not seen it on the head, neck, thorax, or abdomen.

Nature of Projectile.—We have seen it in wounds from rifles, shrapnel, and fragments of shell.

Nature of Wound.—We have seen it in both slight and very serious wounds; but a larger proportion of the serious wounds are affected by it, especially when large bones have been shattered and muscles extensively torn and extruded. We have seen it with and without fractures, and in a relatively large number of fractures of the femur.

Period of Onset.—It is most noticeable that it always shows itself within the first few days or even hours following the infliction of the injury. In two cases we have seen it well marked within thirty-six hours, and in several others already extensive on the third and fourth day. Several patients have died of it on the third day following that of the injury, and in other patients it has progressed so far that amputation has been performed on the third day.

Onset.—This is characterized by swelling of the injured part, and the gangrene seems especially liable to occur in connexion with that swelling of a limb which is due to extravasation of blood in the subcutaneous tissues and intermuscular planes. It seems to us that interference with the circulation either by extravasation of blood or by tight bandages has a marked influence.

In the early stages the patient complains of severe pain which is perhaps due to tension, the result of the swelling, but in the later stages the affected area becomes completely numbed and insensitive. The edges of the wound are generally ragged and sloughy, and a considerable quantity of blood-stained serum constantly exudes and soaks the dressings. This discharge emits a characteristic and most offensive odour which is so marked as to

be almost diagnostic. The skin, if not previously discoloured by extravasated blood, assumes a dark purple or slate-coloured hue. In the vicinity of the wound it changes subsequently to a more green colour. The swelling extends coincidently with the change of colour, and a few hours later the skin becomes nearly black, and finally forms a black, leathery slough. Beyond the area of discoloration the limb is swollen with gas and fluid exudation, and an emphysematous crackling can be elicited on pressure with the hand. This may spread to a distance of as much as a foot above and below the actually gangrenous area, and so rapid is the extension of the gangrene that we have seen the whole of the lower extremity completely mortified before the end of the third day after the infliction of the wound.

Condition of Patient.—Temperature is not materially affected in many cases, and high fever is rare. A temperature of 93° to 100° F. is usual. Respiration is not materially quickened; headache is not complained of. The mind is perfectly clear till near the end. The pulse is not greatly quickened, but rapidly loses power, so that several of the patients we have seen have had no perceptible radial pulse. The heart's action is greatly weakened so that its beat is quite difficult to feel.

Vomiting is common and in many cases is frequent. Diarrhœa is rare. Sweating is not generally present, and before death the skin is cold. The tongue is usually covered with a dirty fur, but the mouth is not exceptionally dry. Death appears to be due to cardiac failure, and we have been struck by the extraordinary clearness of the mind of a patient, almost pulseless, and within an hour or two of his death. In the worst cases the gangrene may spread with such rapidity that the whole limb may be cold, of a purple or black colour, immensely swollen and quite devoid of all sense of touch and power of motion within thirty-six hours of the onset of the gangrene. The smell of such a limb is overpowering, and almost precludes a careful post-mortem examination. If incisions are made before or after death, gas and sanious fluid bubble up. Pus is confined to the edges of the wound and is very little in proportion to the sanious discharge.

The practical conclusions we would draw from these observations are as follows:—

(1) All tight bandages, and especially those applied at the first field dressing, should be avoided. Shell wounds are so often followed by so much interstitial hæmorrhage that the part swells and the bandage rapidly becomes tighter and interferes with the

circulation. Consequently, many bandages require to be cut within a few hours of their application.

(2) In many cases the tension requires to be relieved by incisions and drainage, and the opportunity should be taken to wash the wounds thoroughly with an antiseptic. Peroxide of hydrogen is one of the best. Great care should be taken to remove portions of clothing, as these contain the infective agent. Shattered fragments of bone and pieces of shell or gravel should be taken out.

(3) Amputation may often be successfully performed through tissues made emphysematous by gas but not yet gangrenous.

(4) The group of anaerobes causing gangrene are spore bearers, and spores (especially of this group of anaerobes) are especially difficult to kill by any antiseptic solution or even by boiling. Consequently, in order to sterilize instruments and other things that have been infected other measures are required:—

(*a*) Destruction of blankets and clothing soaked by the discharge.

(*b*) Heating in an autoclave at a temperature of 120° C.

(*c*) Boiling for an hour in a solution of 1 in 20 carbolic acid or lysol (1 in 10).

It should be remembered that the mud on the clothes of wounded soldiers is almost certainly infected, and care should be exercised to see that the area in which operations or dressings of wounds are performed should be kept free from possible contamination from such a source.

(5) Where possible it is advisable to isolate patients under treatment in hospitals, and this is all the more necessary on account of the bad smell which is inseparable from the condition.

The above is a copy of a report sent to the Director of Medical Services on November 9, and is mainly the result of work done at the clearing hospitals at the front to which patients are taken within a few hours of being wounded. Many of the conclusions and practical recommendations, however, have been conveyed to the hospitals verbally or by official communication, and attempts are being made at the Lister Institute to provide an antitoxin.

Clinical and other Notes.

FEVERS IN PESHAWAR.

By Captain W. L. FRETZ.
Royal Army Medical Corps.

The fevers most prevalent in Peshawar during the hot weather are, as in most Indian cantonments, sand-fly or three-day fever and malaria. A few experiments with a view to diminishing the incidence of the former, and in relation to the treatment of the latter, may be of interest, although the results are more or less negative.

Sand-fly Fever.—Experiments by observers of sand-fly fever have proved the disseminating agent to be the ordinary sand-fly, but whether or not the *Stegomyia fasciata*, which abounds in the station, is also an accomplice we do not know. Feeding experiments with sand-flies were commenced here, but, owing to the difficulty of getting suitable subjects to be infected, were abandoned. The writer, however, is quite convinced that his own attack of sand-fly fever was due to the escape of some infected flies in his bungalow. The clinical picture of the disease is too well known to be again described, but it is a noteworthy fact that of all the bloods examined the most noticeable feature was the almost constant eosinophilia. The point of chief importance, however, is the very extensive amount of inefficiency that the disease is responsible for, and the result of experiments here in its prevention may be of interest to those who are working out some practical means for diminishing the spread of this insidious pyrexia.

The agent on which we chiefly relied was formalin, and it was thought that if the bungalows could be saturated with formalin vapour for a short time the flies would be got rid of. With this object a bungalow was shut up one afternoon and the walls thoroughly sprayed with a solution of formalin in hot water. This measure met with but moderate success. As the bungalows are very lofty it was very difficult to spray more than about one-third of the way up, and even only doing this took a considerable time to complete one bungalow. It was hoped that by spraying the walls the sand-fly larvæ would be destroyed. The men living in the bungalow certainly reported a diminution in the number of flies and it may have done some good, as the fever cases diminished. The experiment was also tried of lime-washing the walls of the bungalows and adding formalin to the lime-wash. This, I think, would be an admirable method were it not for the expense entailed, as to be of permanent use it would have to be repeated about twice a week. This measure certainly diminished the number of flies. Sand-flies being attracted by artificial

light the experiment was tried of putting small night-lights in plates of formalin solution. The plates contained flies next morning, but in nothing like sufficient numbers to render it probable that any good had been done.

An attempt was also made to protect the individual by bringing about the excretion in the sweat of substances distasteful to the sand-fly, but this had no effect on the subject. Sulphur lozenges, as recommended by previous experimenters, were tried with this object. A dozen men of the battery of which I was in medical charge and whom I could rely on to take them were put on these lozenges and paraded twice a week and asked their views. They all stated that they liked the lozenges and were sure they had not been bitten so frequently. I regret, however, that I had two cases of sand-fly fever from amongst them. Two officers of the battery also whom I recommended to try them told me they had been bitten just as badly as ever. The pathology of sand-fly fever is still very obscure, and observers have not yet demonstrated whether it is caused by a micro-organism. Blood examinations have failed to reveal any cause of the disease, though giving evidence of its effect. Taking into consideration the predominance of the nervous symptoms—the constant backache, pains in the limbs, head, and eyes—it would be interesting to discover if a careful examination of the cerebro-spinal fluid showed any pathological condition.

Malaria.—Being interested in the article by Major Lambelle, R.A.M.C., in our Journal of December, 1913, and on the suggestion of Lieutenant-Colonel Browne, R.A.M.C., my commanding officer here, I undertook the treatment of a series of malaria cases with injections of amylopsin and trypsin. The cases, nineteen in all, were not specially chosen, but were put under treatment as they came to hospital. They included cases admitted for the first time, and others with up to three or four admissions of fairly recent date. The majority of cases were of the benign tertian type, but two had crescents also and were mixed infections. I append my results in tabular form showing the type of infection, intervals between the injections, results of frequent blood examinations, with reactions to injections and subsequent progress of the cases. As will be seen, the results are not as satisfactory as those obtained by Major Lambelle. Nearly all the cases had considerable local reaction with extreme tenderness and pain, which continued for the remainder of the day, and in several I had very great difficulty in persuading them to submit to their second and third injections. The times between the injections were varied with a view to noting any difference that might occur in the progress of cases, some being given at intervals of five days, others of three. The majority, however, were done after intervals of three days between each injection.

Blood examinations were made daily for the first week, and afterwards two or three times a week. The appended table shows results after the first injection on the various days when the specimens were taken.

Case No.	Parasite	Previous admissions	Date of first injection	Second injection (Number of days after)	Third injection (Number of days after)	Blood on—													Temperature			Remarks
						1st day after	2nd day after	3rd day after	4th day after	5th day after	6th day after	7th day after	9th day after	11th day after	13th day after	15th day after	17th day after	19th day after	First injection	Second injection	Third injection	
																			Deg. F.	Deg. F.	Deg. F.	
1. Pte. K.	*B.T.*	Nil	11.5.14	4	4	+	+	–	–	+	–	–	–	–	+	–	+	+	103	99	N.	*Relapse* on June 10. Quinine.
2. ,, D.	,,	,,	11.5.14	4	4	+	+	+	+	–	–	–	–	–	–	–	–	–	99	N.	100·4	No relapse. Now at Cherat, and has had no quinine.
3. ,, C.	,,	,,	11.5.14	4	4	+	+	–	+	–	–	–	–	–	+	+	+	+	100	N.	100	*Relapse* at Cherat. Put on quinine.
4. ,, D.	,,	,,	12.5.14	6	4	+	–	–	–	–	–	–	–	–	–	–	–	–	104	100·4	101·8	*Relapse.* Cherat (on quinine).
5. ,, R.	,,	,,	12.5.14	6	4	+	–	–	–	–	–	–	–	–	–	–	–	–	100·6	99	N.	No relapse. No quinine. Cherat.
6. ,, A.	,,	,,	12.5.14	6	4	+	–	–	+	–	–	–	–	–	–	–	–	–	102·4	99·4	100	,, ,, ,,
7. ,, K.	,,	3	14.5.14	5	5	–	–	–	+	–	–	–	–	–	–	–	–	–	102·4	100	N.	,, ,, ,,
8. ,, H.	{*B.T.* *M.T.*	2	15.5.14	4	4	+	+	+	+	+	+	+	+	+	+	+	+	+	99·8	101·2	99	*Quinine on June* 1. No improvement from injections.
9. ,, L.	*B.T.*	2	14.5.14	5	5	+	–	–	–	–	–	–	–	–	–	–	–	–	N.	N.	N.	*Relapse* at Cherat. Quinine.
10. ,, D.	,,	3	14.5.14	4	4	+	+	–	–	–	–	–	–	–	–	–	–	–	101·2	99·4	99	No relapse. No quinine. Cherat.
11. ,, K.	,,	1	14.5.14	4	3	+	–	–	–	–	–	–	–	–	–	–	–	–	103	98·6	N.	,, ,, ,,
12. ,, R.	{*B.T.* *M.T.*	2	14.5.14	4	4	+	+	+	+	+	+	+	+	+	+	+	+	+	102·4	99·6	N.	*Relapse* on June 30. Cherat. Quinine.
13. ,, E.	*B.T.*	2	14.5.14	4	4	+	+	+	+	+	+	+	+	+	+	+	+	+	103	99	N.	*Relapse* on June 2. Cherat. Quinine.
14. ,, H.	,,	1	17.5.14	4	4	+	+	+	+	+	+	+	+	+	+	+	+	+	N.	N.	N.	*Relapse* on June 4. Cherat. Quinine.
15. ,, W.	,,	1	17.5.14	4	4	+	–	–	–	–	–	–	–	–	–	–	–	–	99	N.	N.	*Relapse* on June 5. Cherat. Quinine.
16. ,, O. B.	,,	1	17.5.14	4	4	–	–	–	–	–	–	–	–	–	–	–	–	–	101·4	100	99	No relapse. No quinine. Cherat.
17. Gr. D.	,,	4	17.5.14	4	4	+	+	+	+	+	+	+	+	+	+	+	+	+	N.	N.	99	*Relapse* on June 15. Quinine. Cherat.
18. ,, E.	,,	2	15.5.14	4	5	+	+	+	+	+	+	+	+	+	+	+	+	+	103	99	100	RELAPSES on May 28 and 31. Quinine. Cherat.
19. ,, H.	,,	1	21.5.14	4	4	+	+	+	+	–	+	+	+	+	+	+	+	+	101	100	99	*Relapse* on May 27. Quinine. Cherat.

Two slides were taken in all cases. One thin film stained by Leishman's method and one thick film stained by a modified Cropper's method with Gasis' solution (vide *Journ. Trop. Med. and Hyg.*, September 1, 1913, p. 272). The latter method proved very satisfactory. The cases on leaving hospital were all sent to Cherat (the hill station for this division), and I am indebted to Captain H. H. Blake, R.A.M.C., for notes on their subsequent progress. The results will be found in the remarks column. The constitutional reactions to the injections are shown by the temperatures noted. The conclusions at which I arrive are: (1) The injections seemed to have little or no effect on malignant or chronic cases. The two cases with crescents continued to have occasional rigors and parasites in the blood up to the eighteenth day after the first injection. (2) Of the nineteen cases done at Peshawar I have had *twelve* relapses, though the men have all been sent to a hill station. Of the five cases done by Captain Blake at Cherat there have been four relapses and the remaining patient has been put back on quinine.

The following notes on his cases were sent me by Captain Blake:—

Case 1, B.T.	Injected on May 18, 21, 25, 1914.	Relapsed	Quinine on July 4.
,, 2, B.T.	,, ,, ,,	,,	
,, 3, B.T.	,, ,, ,,	,,	
,, 4, B.T.	,, ,, ,,	,,	
,, 5, B.T.	,, ,, ,,	,,	No relapse but quinine given.

"The Cherat cases are all chronics who have had anything from three hundred to five hundred grains of quinine by the mouth. There was no improvement at all in my opinion from the injections. The clinical side showed this as well as the blood examinations."

In conclusion, I must say that though optimistic at first as to the efficacy of the treatment I was soon forced to modify my views. Far from being, as I had hoped, of the nature of a *sterilisans magna*, I found that it was in some cases rather a useless and painful operation. It, however, seems undoubtedly to have some effect on the parasite in fresh infections, and better results were obtained in those cases with the longer interval between the injections. Possibly it may be found that our method of administration is wrong and some modification of this, or in combination with quinine, may prove to be the ideal method of treating this curse of Indian life. I should like to express my thanks here to Lieutenant-Colonel Browne, for many very kind and valuable suggestions while carrying out the above work, and also to Assistant Surgeon Thoy, for his help with blood examinations.

THE DETERMINATION OF MOISTURE AND MINERAL MATTER IN BISCUITS AND FORMS OF CONCENTRATED BREAD.

By Serjeant A. DADY.
Royal Army Medical Corps.

The determination of the moisture and mineral matter present in samples of biscuit or concentrated bread is usually attended with a certain amount of difficulty. These are two of the most important factors for which it is necessary to obtain a percentage value, and if care be taken to obtain a correct result the carbohydrates can then be safely determined by difference.

After considerable experience I have found that the moisture percentage is best obtained by weighing the samples, such as biscuits, without pulverizing, and re-weighing after drying at a temperature of 100° C. in a hot-water oven for eight hours. At least three samples should be dried at the same time to obtain an average. A shallow dish containing calcium chloride, placed in the oven, hastens the drying considerably, where a vacuum oven is not used.

The usual method of grinding in a mortar cannot be carried out without a certain loss of moisture, and when the finely ground sample is dried in a crucible only a small surface of the sample can be acted upon, this dried surface preventing the lower layers from parting with their moisture. Likewise stirring with a glass rod entails very careful manipulation. By using these methods unsatisfactory results are apt to occur. If the samples be carefully weighed and dried whole, the greater surface acted upon causes the sample to dry more quickly and consequently more satisfactory results are obtained.

After removal from the oven the samples should be cooled in a desiccator and weighed, being again returned to the oven and dried for a period of two hours, to make certain that the whole of the moisture has been driven off.

The estimation of the mineral matter must be carried out by means of a tared porcelain capsule or crucible, subjected to a very dull red heat in a muffle furnace, or over a Bunsen flame protected with wire gauze. The residue obtained after estimation of moisture is usually recommended for determination of the mineral matter, but in practice I have found that some trouble arises and a good ash will not result, a considerable amount of carbon remaining.

From experience obtained when estimating the mineral matter in biscuits, bread, flour, etc., it has been found that a freshly weighed-out sample will ash more readily. In a very moist sample a portion of the water may be driven off to prevent spurting, but the total absence of moisture tends to prevent oxidation of the sample.

If, of course, the sample does not lend itself to thorough oxidation, the

contents of the crucible should be washed on to a filter and the residue repeatedly washed with hot water. The filter paper and contents are then again transferred to the crucible and incinerated as before, the weight of the ash of the filter paper being deducted from the final weighing in the usual manner. The filtrate is then evaporated down in the same vessel; incinerated; again weighed after cooling, and the total mineral matter calculated.

A CRITICISM ON THE USE OF "DRY" URINALS IN STANDING CAMPS.

By Staff-Serjeant W. A. MUIRHEAD.
Royal Army Medical Corps.

This note is the outcome of having read the article "A Plea for the trial of 'Dry' Urinals in Standing Camps," by Quartermaster-Serjeant E. B. Dewberry, which appeared in the July issue of the Journal.

How far this type of urinal deserves a trial depends upon its merits over the generally adopted system of pails plus "cresolization." What are they?

Few facts regarding the working of this form of "dry" urinal are given. The late Dr. Poore's experiments in the carpentering works cannot be taken as a guide, for the urinal used by the workmen was not "worked" as one used by troops would be, and for other reasons the results are not comparable.

The chief feature of the system appears to be the pit in which are placed various materials, among which sawdust is to play the major part. What part the stones, gravel and sand are to play is not stated, but absorption of urine by the sawdust is aimed at, for it is said, "The amount of filtrate (?) would be comparatively small." (The query mark is mine.)

The question of the apparently unlimited absorbability of such materials as sawdust, moss, etc., is, to say the least, a debatable one; for, given a pit of, say, twenty cubic feet capacity, when twenty cubic feet of matter have been put into it, whether the matter be sawdust, urine and sawdust, or urine alone, the pit becomes full, and any excess added either flows over the ground at the mouth of the pit or soaks into the soil. If that pit is partly filled with stones, gravel, sand and sawdust, its capacity for urine is reduced accordingly unless the urine, when in contact with sawdust, is possessed of some power of the fourth dimension.

The writer is inconsistent: he states that the sawdust should have a large surface for evaporation, yet the pit cover in the sketch appears to be sealed. In fact, very little evaporation could occur, and that little would be through the untrapped waste pipe (connecting the urinal basins) into the urinal enclosure.

The differences noted in the chemical analyses and physical characteristics of urine before and after passing through sawdust give no assurance that the effluent (for effluent there must be unless the sawdust is removed and replaced the moment "saturation" point is reached) is harmless. Undoubtedly, wherever such urinals are installed the danger of contaminating well or other water supplies in the vicinity must arise in this as in other systems entailing reception pits.

If the trials were carried out, a new system would be introduced, not in place of, but additional to that already existing for latrine accommodation. Provision of night urinals near to the men's quarters would still require to be considered and dealt with. How is it proposed to dispose of the night urine?

The initial cost of such urinals would be considerable, and in addition there would be required either (1) a suitable building, otherwise during the non-training period the system would be put out of action by mischievous persons, or (2) the services of skilled men would be required to erect them at the commencement of training and demolish them when the camp was vacated, each year. An additional charge would be the cost of materials and cartage in many districts.

"Dry" urinals would introduce complications not likely to be welcomed by the regimental sanitary detachments who carry out sanitary services in camp; and the suggestion, in the article referred to, of stirring up, removing, and consequently handling potentially infective material would not commend itself to those charged with the prevention of disease.

It is doubtful if anything more can be claimed for this system than the old-established fact that, where a layer of sawdust is on the surface of urine, in a container, the characteristic odour which accompanies free evaporation is considerably diminished; this may be carried out in connexion with existing systems by replacing the sawdust in buckets or pits, intended for the reception of urine, before use.

Has not the time now arrived when the fact should be recognized that absorbent materials in pits intended for reception of waste matters accomplish nothing, and are simply used to hide from view matters which offend the æsthetic sense? Put briefly, in soldiers' parlance, it is "eyewash."

From a sanitary point of view there are two ways of considering standing camps; these are (1) as permanent summer quarters for troops, or (2) as training grounds for regimental sanitary detachments in the work they will be required to do in war. If the first is the correct way, house the urinal, eliminate the pit, trap the waste pipe and connect it to an existing drainage system, then such a urinal would, "if adopted in standing camps, prove to be both economical and sanitary." If the second is correct, then no sanitary works should be entertained which cannot be made or improvised under service conditions. Whichever is the correct

way of considering the sanitary works of this nature required in camps, the ideal method of disposing of urine (and fæces too) is immediate sterilization "on the spot," or, failing that, rapid removal to and proper disposal in some place well outside the inhabited area.

In the existing pail system, where "cresolization" is in vogue, there is at least an attempt to approach the ideal given. Whether such would be accomplished by "dry" urinals in practice the reader may decide.

As a matter of general interest no doubt many readers of the Journal, like the present writer, would like to know:—

(1) Where can "dry" urinals be seen in camp?

(2) How many stalls are suggested for a battalion, and what is the proportion of stalls to pits?

(3) What is the total cost of, say, a three-stalled urinal?

(4) How many men would be required for the work and for how long?

(5) What are the dimensions of the pit, carrier, etc.?

(6) What is the object of the stones, gravel and sand in the pit?

(7) Where are the results of experiments on the absorbability of sawdust published?

And last, but not least,

(8) Is the difficulty of disposing of liquids in clay subsoils solved by the suggested system?

A SUSPECTED CASE OF FOOT-AND-MOUTH DISEASE IN MAN.

By Captain E. V. WHITBY.
Royal Army Medical Corps.

Foot-and-mouth disease is so rare in man that the following case should be of interest.

The patient was a soldier, aged 19, who gave no history of any previous illness. At Kilworth Camp, on March 17, whilst carrying some boiling water, he fell and scalded his left wrist; later an open septic wound developed. On March 26—that is, nine days after receipt of the injury—he became aware of a burning sensation in the mouth and on his hands, quickly followed by the formation of blisters. He was admitted to hospital on the same day. On the following day his face was flushed and rather congested, the temperature was 101° F., pulse 100, lips were swollen, and there was a marked vesicular eruption, rapidly becoming pustular, all over the buccal mucous membrane; there was difficulty and pain on protrusion of the tongue, which was coated, and on which a few vesicles were seen. Breath very fetid, salivation free, and the speech thick; the nasal and conjunctival mucous membrane were clear, there was a well-marked vesicular eruption on both forearms, wrists and hands

extending between the fingers, and to the sides of the nails; the palms were most affected; the feet were also implicated, but not to such a marked degree. The eruption was primarily vesicular; the vesicles varied in size from that of a mustard seed to a sixpenny piece and were situated on a hyperæmic base about one-eighth of an inch in width, showing no tendency to coalesce. They were larger on the forearms than elsewhere. They caused a burning sensation and were tender on pressure; there was no itching. The bowels were constipated; otherwise there were no other gastro-intestinal symptoms. The heart and abdomen were normal. All superficial reflexes were very brisk. During the next three days the rash became more pronounced; a few isolated vesicles appeared on the face, neck, abdomen and thighs. The mouth was very sore, the vesicles having coalesced, ruptured, and given rise to shallow ulcers, with yellow sloughy bases; the mucous membrane of the lips had the appearance of one continuous yellow slough, the margins of the lips were crusty and dry; there was no excessive secretion of saliva. There was great difficulty in taking fluid nourishment, but no pain on swallowing. The vesicles on the extremities showed no tendency to pustulate, and there was no involvement of lymphatic glands. Serum from vesicles contained no organisms; a few polymorphs were found. There was no leucocytosis; eosinophilia was present to the extent of ten per cent. The urine was high-coloured, acid, specific gravity 1027, cloud of albumin, no deposit; microscopically nothing was found.

The temperature, which had remained at 101° F., fell on the sixth day, and continued normal.

Convalescence was uneventful. The serum in the vesicles became absorbed, and the skin scaled, leaving faintly pigmented areas. The albuminuria disappeared.

The reasons for suspecting this case to be one of foot-and-mouth disease are:—

(1) The disease followed the course of an acute specific fever; its toxæmic origin is shown by the distribution of the rash, the presence of albumin in the urine, and the temperature.

(2) It did not resemble the other hydroa.

(3) There was an open wound on the wrist.

(4) Foot-and-mouth disease was prevalent in the district.

It is interesting to note that a stray collie dog used to frequent the patient's hut for feeding purposes. I made inquiries about this dog, and heard that it had been drowned, because it was suffering from mange of the left ear, and was so thin and weak that it could hardly walk.

Specimens of the serum from the vesicles and saliva were sent to the laboratory at Millbank, where a rabbit and guinea-pig were inoculated, with negative results.

ELECTRICITY IN MODERN MEDICINE.

By Captain J. B. HANAFIN.
Royal Army Medical Corps.

Since ionic medication brings as potent a quantity of a drug as possible to act on a localized diseased part its merits seem apparent. In acute specific diseases medicine taken orally permeates the whole system and combats the specific virus which, as in rheumatic fever, is generalized. In chronic diseases, where the virus in some form is localized and probably in an exaggerated and resistant state, the system must be saturated with the drug and for so long a period that such administration is harmful and dangerous.

With a knowledge of what element enters at the positive pole, and what at the negative, any localized area can have its cellular tissue saturated with ions of a drug. In such affections as neuritis, chronic synovitis, sciatica, etc., I found ionization act most satisfactorily. In sciatica a pad of lint moistened with a solution of sodium salicylate is placed over the affected area. On this a carbon terminal connected to the negative pole of a battery of about twelve volts or more is placed.

The positive or neutral pole should be of a large size and covered with lint moistened with water so as to distribute the current and avoid any local action on the skin. This is placed on an unaffected part of the body near the part under treatment. When connexion is made a burning sensation is felt by the patient, which is accentuated on making or breaking the current. The application may be continued daily till the skin under the negative pole blisters. As the skin resistance to an electrical current is high the current passing through the body is small.

A more direct way of dealing with any area is the following, which I tried on one occasion with satisfactory results. A large bore aspiration needle was connected with a rubber tube filled with a weak solution of sodium salicylate, five grains to two ounces. The sciatic nerve was pierced with the needle and the solution held about one foot above the patient. The negative pole of two cells in series was connected with the needle. The positive pole was moved about on the skin over the region. The pressure of the fluid in the needle forced some of the solution into the sheath of the nerve, which in itself has a curative action, while the continuous current saturated the area with salicylate ions. The tissue around the negative pole has high conductivity and care must be taken not to corrode this by too strong a current.

Ionization of a primary syphilitic sore with mercury before generalization of the spirochætes in the system may prove more efficacious than excision, which does not eradicate all the virus. The bladder or urethra may with facility be ionized through a rubber catheter with a metal director.

Travel.

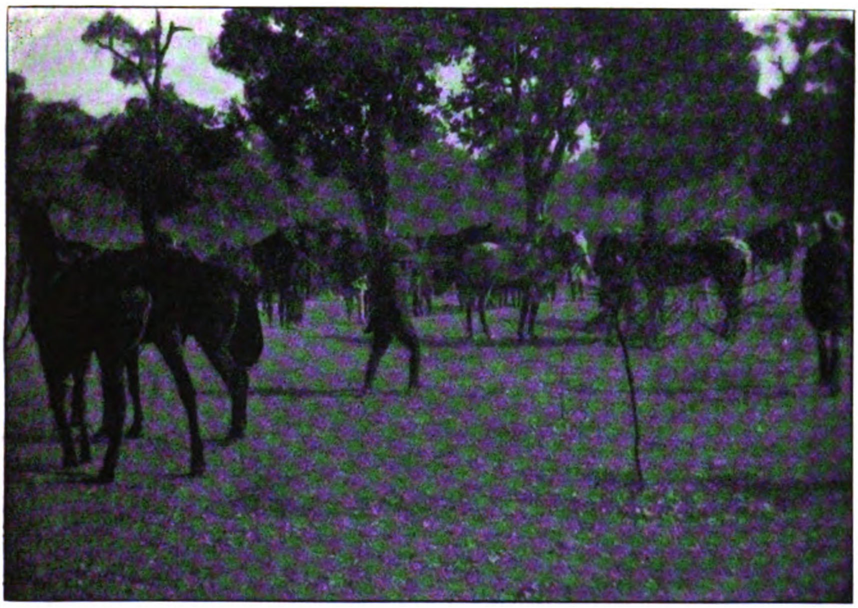
A FEW DAYS' SPORT IN PATIALA.

By Captain W. L. FRETZ.
Royal Army Medical Corps.

A few months ago I was the lucky recipient of an invitation to form one of a cricket team going, as the guests of His Highness the Maharajah of Patiala, to play against his well-known Eleven. As we all had such a cheery time and the tour was so full of incident perhaps a short account may be of interest to readers of the Journal of the Royal Army Medical Corps.

Patiala, as is well known, is a wealthy Native State of the Punjab, and its rulers have usually been notable for their sporting tastes. The present Maharajah is no exception, being, among other things, a very keen cricketer and himself an excellent bat. His Eleven is a very powerful combination, containing, as it does, during the cold weather those well-known Middlesex county players, Tarrant and Mignon. Our match commenced on a Thursday, and was to be a three-day one. The team was skippered by Mr. Bosworth Smith, of the I.C.S., an old Oxford Harlequin player, and our star performers were Mr. R. St. L. Fowler, a former Etonian Captain, and Mr. H. Moore Gwynn, of the Rifle Brigade. Thanks to some excellent batting in both innings by these three, and good bowling by Fowler and Mr. E. H. Puckle, I.C.S., of Lahore, the match ended in a victory for us on Saturday by five wickets. The Maharajah had been unfortunate, as he failed in both innings to do himself justice. The conditions under which the match was played were delightful, ground in perfect condition, and on each afternoon His Highness' band of highly trained musicians played selections from the latest musical successes. Our win was a very creditable one, as it was the first time the Patiala team had been beaten on their own ground, and the first time they had lost a match for four years. Tarrant is, of course, responsible for the team's excellence, as he has trained them all. This thorough sportsman sets them a splendid example of keenness and keeps them all trying up to the last ball. He is most deservedly popular and of very considerable influence. The winter out here, he says, suits him. His daily practice at the nets and a three-day match at least once a week, instead of making him stale, keeps him well in form. That he now tops the English

county averages justifies his view, and that he may remain so is the sincere wish of all our team. The team were put up in the State Guest House, where we were treated with unbounded hospitality and lived in most palatial quarters, and as we discovered amongst our members a musical genius with an extensive repertoire the evenings passed in a very cheery fashion. On Friday morning three of us, on whom the hopes of the side were certainly not centred, accepted the offer of His Highness' A.D.C., who

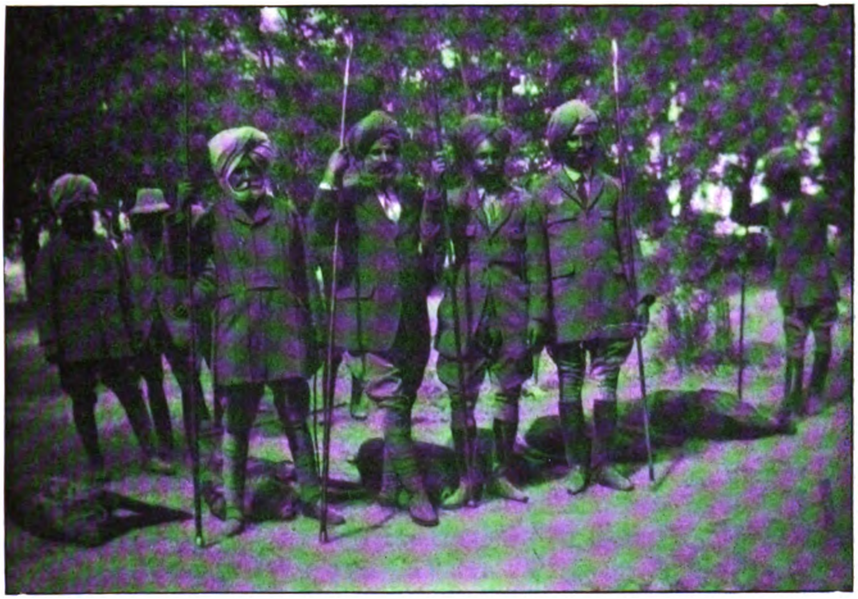


promised to send us round ponies for a morning gallop. As we soon marked down a herd of about half a dozen black buck the ride developed into an exciting hunt. Circling round till about sixty yards off we charged and away we went, to each man a buck. Mine gave me a capital run of about two or three miles, but I must regretfully admit proved too fleet-footed and escaped. This I rather think would be the result in most cases, in spite of the tales with which my fellow-huntsmen regaled the breakfast table—where we met later—of how they had ridden their respective quarries to a standstill, and until "they lay down and panted for mercy." Patiala State abounds in buck, which are preserved by the Maharajah's orders. Being an excellent shot he is very fond of

buck-shooting, though his method is somewhat original, for, chasing them across country he shoots them from a motor-car. As may be imagined, to hit a rapidly moving black buck from a rapidly moving car being driven across cultivated land is no light feat of marksmanship, but he brings them down with the greatest regularity. On Friday evening we, most of us, forgathered in the club. This is a very Westernized building, with English papers, billiard-rooms, card-rooms, and American bar. Here I had the pleasure of meeting old General Chanda Singh. This splendid old Sikh gentleman,

though about 60 years old, thanks to a life spent in the saddle, pig-sticking, and playing polo, even now possesses an Indian polo handicap of 11, which a few years ago was 10. Speaking English fluently, and with the most polished and courtly manners, he has played polo all over the world, having been the guest on occasions of the King of Spain. He it was who kindly promised to arrange a pig-sticking meet for us on Sunday if anyone cared to stay. Eight of us accepted greedily, but the others had to return to their various cantonments. On Saturday morning cars were sent round to take those who cared to go to visit the city and fort. The chief objects of interest there were the museum and the

State jewels. The former is crowded with all the State carriages, howdahs, etc. (several being of solid silver), and various other specimens of Indian art. We spent about half an hour wandering about admiring these, and incidentally speculating on how many return passages from Bombay could be purchased by the sale of an apparently unused dressing-case with silver and gold fittings. The State jewels were also laid out for our inspection and admiration. Seven trusted retainers are responsible for their safe-keeping, each of whom possesses a key to one of seven different locks. The seven



had all been warned the night before and were on parade with their valuable charge. I forget how many lakhs of rupees we were told was the value of one magnificent pearl necklace. In the fort the middle area is bounded by a high and forbidding wall, at the gate through which was stationed a guard armed with rifles. They seemed uneasy until we had passed, when it was explained to us that in this centre building the wives of the late Maharajah, between 400 and 500 in number, had all been incarcerated on his death. When leaving for home as the car seemed rather empty we concluded someone was missing, so one sportsman undertook to count the company. Having omitted to include himself he reported two

absent, but on a recount the numbers were reduced to one. Grave fears were being entertained that this officer's inquisitiveness and his camera had led him into conflict with the guard. Having kept us waiting for about ten minutes he, however, turned up smiling, and explained that he had only been taking photos from the roof. The cricket match finished that afternoon, after which there was polo for anyone who cared to play, of which kind offer full advantage was taken. On Sunday morning two cars were at the Guest House to take us to the pig-sticking meet. The drive out was most exciting, both to us and to several sleepy natives, who several times had to display considerable agility at very short notice. We travelled the last few miles across country, when as the speed did not appreciably diminish the man in the middle on the back seat got a poor time. The "bandabast" for the hunt was a magnificent affair, as we found that old General Chanda Singh had turned out eight State elephants, a half squadron of cavalry, and a company of infantry to beat the jungle, three or four camels to bring in the pigs, and three mounts for each of us. We were in two heats and once the pigs began to break cover were galloping hard all the morning. We got nine pigs before lunch, and several big boars escaped. About 2 o'clock we were taken in to lunch, expecting to find just drinks and a few light eatables. To our surprise we discovered two large marquee tents pitched in a nice shady spot. Here in the middle of the jungle a magnificent spread met our hungry eyes, and pints of foaming "shandy" were poured down our thirsty throats. No wonder we all got to speech-making afterwards, and toasted our hosts for the most delightful four days any of us could ever wish to have. The photos were very kindly sent me by Fowler, and show: (1) The meet; (2) some of the kill; (3) four of our hosts.

A VISIT TO No. 1 MILITARY HOSPITAL, TOKYO, JAPAN.

By Captain J. F. GRANT.
Royal Army Medical Corps.

While on a visit to Japan last summer I was granted permission by the military authorities, thanks to the kindness of Lieutenant-Colonel Somerville, Military Attaché at Tokyo, to inspect the largest military hospital in Japan's capital.

As the opportunity of visiting such an institution does not come the way of many officers of the Corps a short description of this visit might be interesting.

The hospital is splendidly situated on a height overlooking the Imperial Palace and is very substantially built. It is surrounded by a high wall and entrance to the building by the main gate is carefully guarded, no admission being given without the necessary authority.

On my arrival I was received with great courtesy by Dr. Kawashimia, the Principal Medical Officer, and with the aid of Mr. C. S. Hernena, an interpreter whose services were kindly lent me by Captain A. Irvine Fortescue, R.A.M.C., I was enabled to ascertain the general working and administration of this important institution.

Unlike our military hospitals at home the hospital buildings are arranged in separate and distinct blocks connected by raised wooden footways; the scheme is comparable, in fact, to the present separate villa system in vogue in modern asylums in Great Britain.

There is accommodation for 500 patients, and around the main administrative block are arranged separate blocks for medical and surgical cases, venereal, eye and infectious cases. In addition to these there are separate blocks for laboratories, mental cases, nursing orderlies, main kitchen, and an electric power station. The wards are well lighted and scrupulously clean. Each ward has at one end a recreation room for the use of patients allowed up, and there are also separate wards for the reception of serious cases requiring special nursing. The bathrooms and latrines are also excellent.

A Japanese never sleeps on a bedstead, but in this hospital "Tommy" is supplied with the latest pattern wire hospital beds. In place of a bedside table the beds are drawn well away from the

wall and attached to the head of the bed each patient has a neat box in which he places his necessaries. At the top of each bedstead is a wooden ball, which is placed in a conspicuous position. The balls painted half red indicate patients unable to walk, the idea being that in the case of an outbreak of fire the nursing orderlies can see at a glance which patients require assistance.

The officers' wards are a model of neatness and cleanliness, and in the event of an officer being admitted he is nursed by specially trained Army Nursing Sisters, who undergo a course of training comparable to our Army Nursing Sisters'.

In this hospital there is a large and up-to-date operating theatre with every modern appliance. Unfortunately, I had not the opportunity of watching an operation, but the surgeon in charge informed me he had performed this year thirty-six appendicectomies alone. In this theatre were performed hundreds of operations during the Russo-Japanese War, and the records they obtained would be hard to beat. The surgical qualities of the Japanese may be guessed from their skill in artistic technique, but the key to the Japanese records is their belief in what they have learned from Western science. The Japanese are very thorough, as a single instance will illustrate. A few years prior to the late war their soldiers and sailors had fought in the quaintest mediæval or barbaric armour possible, but then before a naval engagement the sailors were compelled to take carbolic baths and to don sterilized underclothing, so that they stood up to the Russian guns in the full modern panoply of a boiled vest and a carbolized skin, so that the injuries inflicted by the Russian projectiles were aseptic. Never before in the history of war did such a large proportion of the wounded return to the fighting line.

To return to the operating theatre, leading out from it is an anæsthetic room. The principal anæsthetic used here is chloroform given in the open method by means of a Schimmelbusch's mask. In serious cases, or cases taking the anæsthetic badly, they employ a König's apparatus for the combined administration of oxygen, chloroform and ether.

The sterilizing-room used in conjunction with the operating theatre and the dressing-room is a model of efficiency, and before entering the theatre everything is sterilized with that same thoroughness which characterizes all their methods. All the surgical instruments used are of the very latest pattern and are practically all manufactured in Japan.

The laboratory in this hospital is very up to date and all the

latest tests in bacteriological diagnosis are carried out here. They employ the finest Leitz microscope. There is practically no typhoid in the Japanese Army and consequently inoculation is not practised. A very few cases of paratyphoid A occur, but many cases of paratyphoid B. The scarcity of cases of paratyphoid A appears extraordinary considering the system of sanitation throughout the country, which is most primitive. Attached to the laboratory is a separate building for the housing of monkeys, rabbits, etc., for use in experimental inoculation.

The X-ray rooms are very up to date, and the high standard of excellence shown by an examination of the plates and prints points to that same thoroughness of technique which characterizes all their work.

Besides X-ray equipment they also employ the electric current in the most modern electric bath treatment of rheumatic and allied diseases.

They also have a dental room, with a qualified dentist, and their venereal wards are the model of perfection. As venereal disease is fairly prevalent in the army the administration of neo-salvarsan is their routine method of treatment. In the administrative block I was shown a well-stocked and up-to-date library containing medical works all of which were printed in German. Practically all the military medical officers can speak German more or less fluently, as after their medical training in Japan they complete their education by studying for a period of two years in the German universities.

OUTFIT FOR SIERRA LEONE.

By Major C. E. POLLOCK.
Royal Army Medical Corps.

Officers ordered to this station are frequently at a loss to know what outfit should be taken. It is hoped that the following notes, based on the at present prevailing fashions, may be of some assistance to those about to make their first trip to the Coast.

General Notes.

In general the climate is hot, damp, and depressing, life is somewhat monotonous, and the station should, therefore, be avoided by the neurotic or weakly individual who is not prepared to make

the best of things. There is a very considerable temptation to absorb alcohol in various forms, but especially in the guise of cocktails, with the result of lowering one's vitality and of adding to the already considerable risks to health during the tour of service here.

Practically, all officers live in quarters, and furniture can be obtained on hire from the Barrack Stores. There are no married quarters for Royal Army Medical Corps and only one very poor house which can be rented for £6 a month. The native of West Africa makes a fair servant provided you do not vary your routine, but is a long way behind the Indian bearer. "Boys" are paid one shilling a day and feed themselves.

From October to April there is little rain and a certain number of games are possible. Chief of these is tennis in asphalte courts. There is one squash court at Lower Hill and a rather poor 9-hole golf course about a mile and a half from Lower Hill, and a swimming bath at Lower Hill. Hockey is played during the rains at King Tom. There are a certain number of beautiful walks, almost all of which involve a climb of five hundred to a thousand feet or more. Fishing for barracouta and tarpon is also indulged in with much hope and little success. Butterflies and birds are plentiful and beautiful, and collectors can easily fill up much spare time in their pursuit.

Photography is seriously handicapped by the damp, as paper and films deteriorate very rapidly, while the water being usually about 80° F. makes development dependent on a supply of ice and the use of hardening agents. There is a fair garrison library from which books can be obtained on loan.

Most of the Royal Army Medical Corps officers are in one of the three stations at Freetown; three of the Captains are always in the Bush Stations. Round Freetown there is little or no shooting. In the Bush stations, Bush fowl (a kind of partridge) may be shot. Big game shooting—elephant, Bush cow (buffalo), hippopotamus—involves an expedition into the interior, and the results are often very poor in comparison to the expense, trouble, and risk to health.

As to outfit all Captains must expect to do a tour in a Bush station; they should, therefore, bring out at least a couple of air-tight metal cases weighing not more than 50 lb. when packed. All carriage is on carrier's heads. Heavy packages can be moved by slinging them from poles, but this is not always possible on paths and is not liked by natives. Every Captain should bring out a good camp-bed, fitted with mosquito curtains, mattress, and

pillow, unless he knows he can get one from some one going home. Other articles of camp equipment can be picked up locally or improvised, but it would be suicidal to venture into the Bush without a proper mosquito curtain. White is a better colour than green as mosquitoes are more easily seen against a white background. The general opinion is against mosquito rooms. It is impossible to ensure that no mosquito is inside, this involves a prolonged search before making use of the room, the sides rarely rest closely on the ground and in Bush stations the roof is a favourite nesting place for ticks.

Uniform.—In Freetown most corps wear Bush shirts, short gaiters or putties, and a Cawnpore topee. Medical officers wear the khaki jacket, slacks, and helmet, with khaki shirt and tie. In Bush stations all officers wear the Bush shirt and shorts. In drill order khaki breeches, jacket, gaiters, and Sam Brown belt are worn.

Full dress, white with gold belt, is required for funerals and for an occasional ceremonial parade. At mess in Freetown, officers wear blue overalls, Wellingtons, cummerbund or white waistcoat and white jacket. In the Bush, white jacket, tennis shirt and black tie, cummerbund and white flannel trousers tucked into mosquito boots.

Outfit to be brought out.

Uniform.—Helmets: white with badge, and khaki field service cap, for the voyage out. Jackets: 2 white mess, 1 white patrol, 2 khaki with corps badges on the collar (not "R.A.M.C." on shoulder-straps); 2 pairs slacks, 1 pair breeches, 2 pairs khaki shorts[1], 1 pair white overalls, 2 pairs putties or putty stockings, 1 pair gaiters, 2 pair brown lace boots, mess and ordinary Wellingtons; 3 Bush shirts with collars and spine pads, 2 khaki ties, Sam Brown belt and sword, gold belts and steel scabbard for sword, 2 white waistcoats for mess, 1 cummerbund, 1 thin waterproof (khaki), gum boots (for the Bush), waterproof cover for topee (for the Bush), khaki umbrella[1], mosquito boots[1], 2 black dinner ties, 4 khaki thin cotton or taffeta shirts, 6 khaki collars, tennis pattern, half-size larger than usually worn.

With the exception of mess overalls, no blue uniform and no service serge is worn in the command.

Plain Clothes.—Evening dress, 6 soft-fronted dinner shirts, 3 stiff-fronted dinner shirts, black shoes, a cheap thin flannel suit

[1] Articles marked thus can be obtained locally.

for visiting; sun hat, Cawnpore topee is most useful all round, Panama or soft felt hat for afternoons.

Four tennis shirts, for tennis players; 2 woollen shirts for walking; 3 pairs of white trousers, ordinary flannel is not satisfactory as it will not stand local washing; 2 pairs tennis shoes with thick soles; Admiralty rubber or balata soles wear best. Spare soles should be brought out as the courts are very hard on them.

For walking at least 2 pairs of strong boots having thick soles and nails round the edges of the sole should be brought out. One pair of brown shoes for calling. When walking shorts and stockings, or gaiters, or putties may be worn, or flannel trousers. For six months of the year the roads are deep in brown dust which penetrates the material of the trousers and refuses to be removed. If trousers are to be worn for walking they should be of some dark coloured flannel. At least 12 pairs of socks should be brought out. All should be woollen and not too thin. Soldiers' regulation socks are worn by many officers. A sweater or knitted woollen waistcoat is most useful to put on after playing any game.

A light dressing-gown of washable material is a great comfort. An electric torch, with refills is well worth bringing.

Bedding and Linen.—Two pairs cotton sheets, 1 blanket and 1 pair of thin woollen sheets, 4 pillow cases, 4 bath towels, 4 hand towels, 4 sets of thin woollen pyjamas, 2 thin flannel cummerbunds.

Needless to say that the officer should provide himself with the necessary implements for whatever form of amusement he means to take up. Except household necessaries little can be purchased here and if sent for to England it takes five weeks to obtain any article.

Owing to the damp heat, insect life, and local methods of washing, everything deteriorates very rapidly. With moderate luck and great care the kit enumerated above should last for the first year of the tour.

Echoes from the Past.

RECOLLECTIONS OF GENERAL PRACTICE.

(From the Middle of 1857 to the Middle of 1883.)

By Surgeon Major-General Sir A. FREDERICK BRADSHAW, K.C.B., K.H.P.

(*Continued from p.* 465.)

Among men patients many noteworthy cases were met with. One in particular deserves mention because illustrating the remedial power of drugs—a power which some medical men are apt to undervalue. The patient was an officer on leave at a Himalayan Hill station and ill with typhoid fever. He was not under my care, but I saw him in consultation. The disease had so far advanced that death appeared to be imminent; the body exhaled a bad odour, insensibility was nearly complete and the nurse reported the urine to be very thick and red. It was found to be so dark and albuminous that bleeding from congested kidneys was diagnosed; it had become altered suddenly, had been examined carefully and frequently before and seen to be normal. As the patient was sinking fast, losing life through losing blood, immediate medication was necessary. Liquid extract of ergot and tincture of perchloride of iron, of each twenty minims, were given every half hour. After a few doses the hæmorrhage was stayed, the urine becoming clear again. Recovery followed without further complication. Bleeding from the kidneys as a complication of typhoid fever is not at all common, but congestion of them has been noted. In this case there was no history of bladder mischief nor the least indication of such; the characters of the urine, therefore, compelled the inference that the blood had renal source. Some months afterwards I came across the patient looking vigorously well. He referred to his illness and remarked inquiringly, "I was not so very bad, was I?" Astonished at this question I replied that never before nor since had I seen so remarkable a recovery from impending death—that in fact his feet were actually in the grave! Hearing this my friend turned pale, felt faint and sank into a seat, quite overcome by the shock of being told he had been in such extreme danger to life.

Here is another instance of the value of drugs. When stationed at Devonport in the earliest eighties, one of my soldier patients had

pericarditis, the progress of which was very rapid, effusion becoming extensive to a degree causing great oppression of the heart's action, also of respiration. Active treatment being urgently called for I decided to give iodide of potassium in doses then considered large indeed. Thirty gr. every hour were administered, and my enterprize was rewarded by speedy absorption of the effused serum and excellent convalescence of the man.

Many cases showed me the really effective doses of medicines had to be learnt in actual practice. Very many years ago a series of articles appeared in the *Practitioner* giving instances of doses of seemingly hazardously large quantity which had been found requisite for producing the desired result, the pharmacopœial doses named having proved quite ineffective. I studied the articles with great interest and subsequent profit. But it was only in emergencies that I employed doses which might be thought adventurously huge; ordinarily I gave doses quite small but frequently repeated. One caution has to be borne in mind in respect of dosage with potent remedies. One ought to feel confident that the prescribed drug is absolutely pure. A prescriber has need to be wary, as conceivably a drug presumed to be genuine might because of adulteration or of impurity in manufacture be unreliable, and if a larger dose ordered happened to be supplied of pure composition by another chemist the quantity might be an over-dose causing possibly serious or even fatal consequences.

As mentioned in a previous paragraph it always seemed to me, an army doctor practising anywhere, very desirable to make the fullest use of simplest remedies whenever possible; camp of exercise or campaign conditions rather negatived possession of complicated apparatus. Two examples of simple treatments occur to mind. A young officer showed on his penis a syphilitic sore which rather quickly had attained dimensions alarming to him; it was circular, about three quarters of an inch in diameter, and with much thickened cup-shaped base. He was much ashamed of his plight and most unwilling to be put on the sick list. I treated the case with common cold water. He had to fill a can of about one quart capacity and pour the water from a foot in height and in a lead pencil sized stream steadily on the sore and repeat the irrigation four times daily, the sore to be covered in the intervals with simple cerate on lint. Healing took place with surprising rapidity and without leaving any trace of ulcerous process; no secondary symptoms followed.

The other example was in a case of sudden and sharp lumbago

doubling up the victim, a young and sturdy serjeant. He was in such pain and so grievously inconvenienced by the inability to straighten himself as to be ready to undergo any kind of treatment. I thought the case a favourable one for trying what Corrigan's button could do (it is called nowadays by the formidable name of Corrigan's cautery I think). With the help of a spirit lamp making the "button"—really a flat disc—unpleasantly hot to one's fingers two inches away up the metal handle, I applied it to the man's loins. Every contact made him wince jerkily and left a white circular patch; about a dozen applications sufficed, he declared himself free from lumbar pain, got up, stood erect and walked away. The smarting of the button stings passed off and not one of the patches blistered; I did not hear of any recurrence of the lumbago.

The following was a peculiar case in one respect. It occurred in a Himalayan Hill station. An officer with his bride had come up and not thinking the sun had power at that elevation, over seven thousand feet above sea level, was careless in exposing himself and got sunstroke severely. He proved rather difficult to manage and soon became insensible. While the case was advancing to a fatal termination the wife's agitation became painful to witness, and she implored me to bring her husband back to consciousness. Thus urged I thought of a possible means and put it in practice. Calling for boiling water and a big sponge I applied the heat to the patient's thinly-covered scalp. As the heat penetrated the brain he suddenly sat up with awakened senses and the eyes of husband and wife met. Encouraged by this appearance of success I kept up the heat stimulation but presently it ceased to act. He sank again into coma and then passed away.

One case of urticaria considerably astonished the person affected. He was an elderly officer on short leave to the Hills. I was called in haste and found him almost maddened with nettle rash. I inquired: "You have been lunching out?" "Yes." "And much appreciated salad, custard and other sweets; and you thought the claret quite refreshing?" "Yes, yes." "Then your present discomfort is explainable as an instance of stomach vigorous rebellion." An antacid with castor oil soon relieved him of the torment, and good resolutions as to diet in future were made and kept, I daresay, impressive knowledge having been gained as to the close sympathy between the internal and external skins.

Examples of idiosyncrasy connected with medicines seldom appeared. A colonel of artillery informed me that opium in any

form gave him collicky pain instead of ease—a warning to me that came too late. One lady could not take a mercurial in the smallest quantity without profuse salivation following ; and another's system was as intolerant of belladonna.

Strictures of the urethra often had to be dealt with. Holt's dilator gum bougies and metal catheters filled with warm water or warmed by friction, all had use. One patient was considerably taken aback when informed that his hesitation in micturition had for cause a stricture; of its existence he had not the slightest suspicion, but close questioning elicited a confession that he had had gonorrhœa some twenty years previously and never afterwards.

A case of acute epididymitis had been admitted into hospital. The man, a big, robust soldier, was suffering so severely from the pain in spite of the usual treatment by leeches and fomentations that relief was an urgent need. On careful examination a small (size of a filbert) and firm swelling was detected in the globus and judged to contain effused serum of distending pressure. I told the man that I might be able to give him quick and lasting ease if he could face a quite momentary increase of his pain. He agreed, and was informed that if he moved even a quarter of an inch I might fail to do good. Getting ready my favourite little Paget knife (double-edged, slender and lance-pointed) the man stiffened himself, and I passed the blade—previously well warmed (to facilate penetration)—into the swelling, which immediately subsided through escape of contents. The relief was instantaneous. The man's frame relaxed; his pain vanished and did not recur. The case did very well. I had not heard of this treatment by puncture and was much pleased with the success of it.

When my battalion went into quarters at Lucknow in 1859, after the Mutiny campaigns, eye complaints became very prevalent among the men. I was placed in charge of the eye ward, and had very many cases of conjunctivitis, iritis, corneal ulcer, and one or two of gonorrhœal ophthalmia. In a few instances I suspected wilful causation of the ocular trouble by men desirous of being invalided home. One case of corneitis gave me anxiety, as both corneæ became so cloudy as to make me fear perforation or staphyloma. The patient was an old soldier, strong, sturdy, and healthy. As treatment did not avail to arrest the disease, I decided to try the "rest cure," i.e., to put Nature in the best possible condition for self-help. I closed the eyelids with sticking plaster and covered them with bandages of loosely woven texture, so that heating might not happen. Day after day I asked how his eyes felt, and

he said they were quite comfortable. At the end of rather more than a fortnight I opened the eyelids, and was delighted to find both corneæ bright and free from every trace of disease. The cases of syphilitic iritis were readily cured by large and repeated doses of potassium iodide.

I found much fault with the ordinary opaque eyeshades covered with green calico, and substituted for them small veils of green muslin, through which the patient could see. I have never met with an eyeshade more sensible in design than the occhiombra, the transparent ventilating eye-shade, which entirely shuts out sky and ground glare and dust, and enables the wearer to see his way about while keeping the eyes cool.

Some cases of chronic conjunctivitis I treated with success by employing the method of douching the closed eyelids about three times a day with water regulated as to temperature by the patient himself according to the sensation of comfort obtained. The judicious duration of each douching he had to discover for himself. Although the cure was slow, it proved certain and lasting of a troublesomely inconvenient affection, especially in a climate like that of India in the plains.

The influence of tobacco upon men's health in India early attracted my attention, and for about twenty years I kept the subject under observation both in the hills and in the plains. I came to the conclusion that in the large majority of smokers who indulged in the habit to merely a moderate extent, the nicotine did neither good nor perceptible harm. In a very small number of the minority the weed had beneficial action, and in the remainder it did positive injury. And I noticed that as a general rule smokers as a body were rather more prone than non-smokers to be attacked by ailments, and when ill to be somewhat slower in regaining health.

Two cases are rather vividly in my memory. A soldier was under treatment for ulcer of the cornea of one eye, an ulcer which responded as a rule to the application of gelatine lamellæ of sulphate of copper. But this man's ulcer would not heal. His skin being flabby and greyish, and his hands puffy and bluish, I suspected that healing was being retarded by tobacco. Day after day I asked: Do you smoke? Always he replied that he did not. At last I said in despair: Do you chew tobacco? He confessed that he did! Feeling angry with the man for his equivocating deceit, I told him that his eye might now take its own course, and that he was likely to lose it. And as he was not to be trusted to

obey orders intended to benefit his case, I directed that all remedies be discontinued. Next day the man being cowed and frightened about his eye—no doubt he had had to listen to some remarks of stingingly contemptuous kind from his fellow patients—he begged me to look at it. I refused, declining to waste time upon a fellow of his stamp. The following morning he humbly entreated me again to see his eye. I did look, and saw that the ulceration was arrested. However, I would not do anything. I felt certain that he had stopped chewing, but it was desirable to give him a lesson. Next day suitable treatment was resumed, and complete healing quickly ensued, hindrance to Nature having ceased.

The second case of nicotine poisoning was graver, and in a way remarkable. A soldier clerk came to me, stating that he feared he going out of his mind, as he was feeling so unstrung and weak in the head; his nervous agitation and alarm were striking. Observing that his breast pocket was bulging as though containing a pipe, I asked if he smoked, and elicited that he did, and to an extent which in my opinion was most certainly excessive. I told him that his symptoms might have really serious meaning, but as possibly they were being masked somewhat by the smoking, it was essential to my arriving at a correct view of his case that the effect of the tobacco should first wear off. He was to come to me in a week's time, and to refrain absolutely from smoking meanwhile. He perceived the sense of my ruling, and promised to abstain. Before sending him away, I confiscated his pipe and the supply of tobacco then in his possession by way of removing temptation! At the end of the week he returned grinning with relief, and saying he felt all right now, and was convinced that it was tobacco alone which had caused him so much mental distress and apprehension.

One of my regimental brother officers was devoted to his pipe. Always he seemed to me to be below par to a degree that the hot weather of the time (in the plains) did not account for; his skin and hands denoted slavery to nicotine! Repeatedly I warned that it would go hardly with him if illness set in, but being young and confident, he laughed and persisted; but before very long he had to be put on the sick list. There was not any defined ailment, and general debility was diagnosed. Neither climate nor special weakness of inherited constitution appeared to be at causative fault. He was invalided home and died from consumption, I heard; but while under my observation lung trouble was not detected, though carefully sought for.

Certain cases of cardiac valvular disease afforded me much

instruction, and led ultimately to moderation of prognosis. A young candidate for employment under the Government of India came to me to be examined as to physical fitness. Finding a bruit persistent while standing, and recumbent, I declined to pass him. But knowing how serious the decision was, I sent him to a colleague of more experience, and, perhaps, not quite so particular. He passed the candidate, who served the country long and well, and apparently without any cardiac hindrance.

The valvular mischief in three other cases was very pronounced, and respecting them I took a despondent view. Only for a short time were they under my care, but some ten years afterwards I met two of the patients. One was walking alertly up a steep slope; he came to see me and allowed auscultation; there was no bruit audible, and he said that for many years his heart had not troubled him. The other stated that he had not been conscious of hampered action of the heart since first I had to do with him; in him, too, I failed to find anything wrong with the organ. Thereafter I regarded with less disquiet than before, cases of organic or functional murmurs. I had been professionally brought up to believe that any alteration of cardiac sounds always had serious meaning.

When making, in administrative capacity, the usual periodical inspections of hospitals and barracks, I always caused the troops to be paraded in order that I might judge for myself, also for report to the general officer commanding the division, as to the state of health of the fighting force. Occasionally I noticed a man seeming not to be all right and desired that he might be sent to the hospital for examination. I have seen now and then a man with a small sinus below the mouth, connected with, as proved by probing, a tooth stump; a gumboil having opened outside instead of inside. Extraction of stump was quickly followed by closure of the sinus and improvement in the late owner's aspect.

Once it was reported to me that scurvy had appeared in one company of a regiment stationed where vegetable food was rather scanty. The alleged cases were brought forward, and I saw that simulation of the complaint was caused by accretion of hardened tartar encroaching on the gums and inducing ulcerative bleeding. I made the company serjeant stand behind me to witness what I was about to do. Then with a penknife, the only handy tool, I levered off the calcareous deposit from a tooth of one man, thus making quite evident the nature of the "scurvy." The instructed serjeant marched his men away and nothing more was heard of the

disease. During the march of the Zhob Valley Expedition of 1884, I saw several villagers with incisor teeth lifted very nearly out of the gum by downward deposit of tartar; the teeth being kept together by most skilful linking with iron wire.

During the Indian Mutiny campaign, an extraordinary case of surgery presented itself. Owing to a camp emergency I took very temporary charge of a regiment of native infantry. In the hospital a man was shown to me with a hard lump in the middle of his tongue, the history of which was that it had followed a wound by a bullet, had existed for months, and was causing extreme inconvenience. Examination of the mouth showed that the bullet must have passed sideways into it, shaved off the crown of a tooth, and by a parabolic curve gone into the tongue and out through the floor of the mouth. Thinking it unlikely that the lump in the tongue could be a tumour and that possibly it contained something encysted, I explored with a probe along the median line, and exerting slight pressure the probe slipped into a cavity and struck against something hard and smooth. I slit open the cavity and the lost tooth crown appeared, greatly to the relief of the Sepoy, and to the astonishment of the other inmates of the hospital tent.

The same year a doctor friend told me of a case of medico-legal interest he had met with. A native was stabbed through the heart and yet lived for at least a quarter of an hour afterwards. The legal question arose: Could the man really have lived so long after having received a wound ordinarily most speedily fatal? My friend's opinion was that the stabbed man had fainted from the shock and remained inanimate long enough for a clot to have formed and closed the wound; that this effort at self-healing had lasted until consciousness returned and activity of circulation recommenced with force sufficient to displace the clot, death then ensuing.

Besides "managing" his patients, a family doctor has not seldom to manage their relations and friends as well; psychologic diplomacy comes in useful.

Under my official care was an elderly officer who professed to have very small regard for doctors. Hearing that he was not well, and knowing his peculiarity, I went to see him and explained that I did not come to offer my services but merely to watch the progress of his case if he would kindly allow me. I remarked that opportunities of seeing disease left entirely to its own course were so very few that it would be a piece of medical good fortune to embrace one. He listened grumpily but consented to my visiting

him. At our interviews I carefully refrained from conversation other than upon his symptoms and did not show the smallest interest in him personally. This moral regimen soon ceased to agree with his human nature, and we subsided into docile patient and friendly medical adviser. It rarely happens I think, that a sick person prefers his doctor to be absolutely indifferent to him as an individual and to regard him only as a case more or less interesting.

I have on occasions resorted to a simple method of disconcerting people of sourly critical disposition. It has been said to me by men intending to be disagreeable and being at the same time in good health: "Perhaps you think yourself infallible and therefore get angry if your advice is not followed." I have replied: "When consulted professionally I consider most carefully all the circumstances of the case in order to be able to give the best opinion or advice at which I can arrive, it being an imperious medical duty to place one's best at the service of the patient. But, secretly, it would please me equally whether the opinion or advice were acted upon or disregarded. If failure followed my counsel my experience would be enlarged and corrected; and if it succeeded my judgment would receive confirmation with resulting intellectual gratification." "Oh, then you look upon patients as merely cases to be dealt with?" "Certainly, I could not think of obtruding sympathy or of displaying interest in the mere personality concerned."

On occasions not quite infrequent I have had to "manage" refractory mothers inclined to be disobedient to "doctor's orders." One lady with charming little girls resented my injunctions to dress them in accordance with my ideas of prudence inspired by the local conditions of climate. The station was Himalayan, the range of noon and evening temperature considerable, the occurrence of cases of hill diarrhœa notably great and the treatment of them unsatisfactory. In the case of children it was indispensable so to dress them as to prevent abdominal chills in particular. My friend objected: "What a figure you would make the children." I pointed out that preservation of health was of even more importance than pretty clothing. She would not agree, and at last losing patience with her unreasonable opposition I remarked: "I shall call in three days' time, and if I do not find your children dressed as I desire I shall write to your husband (then in the plains) and tell him that you are neglecting his children. Moreover, if, when I call I am not admitted, I shall write to him all the same." She was indignant and still perverse. However, when I did call

she presented the children clothed safely and really tastefully, so I complimented her warmly on their appearance, and said I would quote her to other mothers as a real expert in dressing children beautifully. She seemed appeased and perhaps did not bear me ill-will afterwards.

Some pages back I gave an instance of diplomacy in relation to a case of dentistry in a young lady. Another instance of diplomatic intervention was the following: I was asked to see in consultation a lady with dropsical accumulations consequent upon organic disease. Her condition was in fact one of internal drowning. Some abdominal enlargement was present but not prominently, but effusion into the pericardium and œdema of the lungs were acting so oppressively as to threaten life ominously. Tapping the abdomen did not appear to be sufficiently promising as to relief of the heart and lungs, but diminution of the serous effusions was urgently indicated by the symptoms. The kidneys clearly were incompetent to carry off the liquid and it was obvious that the bowels must be made at once the outlet, the state of the patient not admitting of any delay. The hostess friend of the patient was summoned and the state of affairs explained, that the only course was to induce looseness of the bowels. The words frightened the friend ; she said that diarrhœa would kill the patient and consent she would not. It was pointed out to her that the dropsical water was steadily suffocating the invalid, and that unless the water could be got away she must die. Still the fright and opposition continued ; plain English became necessary : "This patient is your guest and you are responsible for her safety. She being dangerously ill two doctors have consulted about her case ; there your responsibility ends. They state as their professional opinion that a certain method of treatment affords the only chance of life. Are we to understand that you, who cannot realize the position of affairs, do deliberately deny to your friend this only chance of life?" The hostess was cowed and gave in. The treatment, by elaterium and brandy, was carried out and the threatening of death averted. The ultimate ending of the case I did not learn, but I know that the patient survived for some time.

An experience in nursery discipline may supply a useful hint to harassed parents. The mother of a quite young family asked my advice about her baby who would not go to sleep except in her arms, and resented so vehemently any suspension of the indulgence as to frighten her into compliance, with the result that she was feeling quite worn out. What was she to do? Neither she nor

her husband could get rest at nights. I examined the baby and found that he was in vigorous health. Accordingly I counselled as follows: When your bedtime comes, and you find baby awake, kiss and caress him, and then go away. If he begins to squall, as probably he will, go again to him, and see that his bedding is all right and his arms free, and then leave him. When he recommences his outcries, take no notice; he will then yell with such furious violence as to alarm you into believing that he will have a fit; nevertheless leave him alone to scream until he is tired or sleepy. Next day I called to ask the result of the experiment in nursery training. The mother said she had done as I directed, but the baby had screamed so loudly and so long as to frighten her seriously, and she would have gone to him had her husband not held her back in bed. I advised that as fears about a fit had been dispelled, she should treat master baby during the coming night as before. She did, and also during the third night, when the experiment ended satisfactorily. It was a revelation to the parents that a healthy infant could display such an outburst of temper.

During the years, twelve in all, that I was on the personal staff of Commanders-in-Chief in India, I was present at many camps of exercise and durbar assemblies. My custom was to preach to the members of the headquarters staff certain precautions for preservation of health. One general habit was to drink as earliest morning refreshment before taking to the saddle a cup of tea. I noticed that the tea as usually made was strong and hot, and that as soon as the stimulating effect of the warmth had passed off, the tannin caused heartburn or other stomach discomfort. Between this morning cup and breakfast there was often a long interval spent in riding about the camps, and headache ensued from want of food or from the heat of sun or glare of light. My suggestion was, that instead of the tea, either warm milk or plain warm water should be taken, and a couple or so of Huntley and Palmer's ginger nuts. These "nuts" being dry and brittle, could not be eaten without much munching; the ginger acted as suitable stimulant to the stomach and the flour as food, both counteracting tendency to cerebral ache. The plan was widely adopted with excellent results.

Another recommendation was that every officer should provide himself with an india-rubber hot-water bag. There is no agent of external application more generally useful than dry warmth. For easing pain anywhere and for bodily comfort in tents in cold weather—as in Northern India—it is an extremely convenient way

of employing heat. I have myself relieved a valuable charger of severe colic by means of dry heat thus applied. The bag was large, the water very hot, the air expelled, and the resulting thin cushion kept in constant stroking motion on the lying down animal's belly. It was very reassuring to the owner to see his horse's body relax as the warmth pervaded its stomach—perhaps warding off inflammation. Recovery soon following and no medicine was required.

My only other experience in veterinary practice was when I acted as accoucheur to a cow! The after-birth did not come away, and the cowman being anxious about the animal's safety, appealed for commiseration to the bystanders, though hardly expecting help. I volunteered to do something for the poor beast, and proceeded with oiled hand and arm to detach and withdraw the placenta which was done without difficulty, the cow standing quite still as if conscious that assistance was being given to it.

A quaint interview which I had with a hen might be mentioned in this medley of recollections. I wonder if any reader of these pages has ever actually seen a hen lay an egg. Once and once only was I an eye witness of such parturition. In 1857 when lying one afternoon on my camp bed, a hen rushed suddenly into the tent, jumped upon me and settled herself in the hollow formed by my bent arm, quite regardless of her human host. Watching the bird I saw her eyes close, the lids turn pale and insensibility apparently set in. The egg was then expelled with soft shell which at once became hard. She revived, clucked and bolted, leaving the egg with me as a midwifery fee.

Three marching "tips" need not be omitted. The first is: when making halts on the line of march, the posture should be the prone, thus taking the body weight off the feet, a most restful relief. The second is: when about to march and in order to prevent footsoreness, two pairs of socks or stockings should be put on, a cotton pair next the skin and a stout worsted or woollen pair outside. The third is: when ascending a hill, to go slowly and to breathe in with one step and breathe out with the next and so on; by this expedient stress upon the heart and lungs is minimized by proper oxygenation, and fatigue is lessened even when great heights have to be reached.

As the last of recollections, I must repeat a tale told me by a medical friend a great many years ago. He was in bed fast asleep, under a window through which bright moonlight was streaming, his slumbering little son lying by his side with face on the pillow and turned towards the window. Quite suddenly the father woke

up to full consciousness and instinctively looking at his boy, saw an enormous centipede had crawled so near to the child's open mouth as to be about to touch the lips! Had contact ensued the lips would have closed and been clawed by the struggling insect; the child startled out of sleep would have been frightened beyond endurance and very probably sent into convulsions. Luckily for him there was a father at hand and abundance of light. But what was it that woke the father so suddenly and opportunely and to such complete wakefulness? Perhaps the child's guardian angel intervened. Or, there happened a miracle of coincidence. Or, again, perhaps explanation can be surmised by enlightened folk professing acquaintance with some of the more things in heaven and earth than are dreamt of in philosophy!

With a tribute to the goodness on the whole of human nature I make an end of this discursive relation of incidents in my practice of the art of healing. A family doctor is of necessity much behind the scenes of his patients' domestic life, and it has chanced that my experience was gained among all social grades. Great is the admiration with which I have observed the real kindness and active sympathy displayed by relations and friends to those in bodily or mental distress or diseased. As a rule the women in the house have been devoted, patient, tactfully helpful and enduring; the men have shown warmth of feeling and considerate tolerance of weakness of purpose or waywardness of conduct. I think very well of my fellow creatures!

Reviews.

Diseases of the Rectum and Anus. By P. Lockhart Mummery, F.R.C.S. London: Bailliere, Tindall and Cox. Pp. viii + 348. 102 illustrations. Price 7s. 6d. net.

This well-illustrated book is a practical guide to the treatment of diseases of the rectum and anus, diseases from which, the author points out, nearly 50 per cent. of the population suffer during some period of their lives. The book is founded on the large experience of the author and the practice at St. Mark's Hospital.

The descriptions are clear and practical and the various operations are described in such a way that they can be easily followed, while the antiseptic technique in the preparation of the patient before an operation is a useful addition.

Chapters V, VI, XIII and XIV, on piles and fistula, are extremely good and can be well recommended to those who are constantly treating these cases in their practice.

The author points out the dangers of trusting to the symptoms in diseases of the rectum, and states that only by a careful examination can one come to a correct diagnosis. J. M. R. R.

THE ILEO-CÆCAL VALVE. By A. H. Rutherford, M.D.Edin. London: H. K. Lewis. 1914. Pp. vii + 62. Price 6s. net.

The contents of this book constituted a thesis for the M.D. degree submitted to the University of Edinburgh. The author deals most exhaustively and in a most painstaking manner with the valve in question.

The points to be decided upon were:—

(1) What is the normal appearance of the valve?
(2) Is the valve normally competent?
(3) What is the function of the valve?
(4) What is the value of the muscular fibres?

To question (1) he gives a full description of the morbid anatomy of the valve. To (2) he states that it is competent. He says, in answer to question (3), that the valve is a sphincter and regulates the flow of the intestinal contents and prevents regurgitation. With regard to question (4), he states that the fibres are conterminous with those of the small and large intestine and act as a sphincter.

The book is beautifully illustrated with coloured plates remarkable for their clearness. F. E. G.

THROUGH THREE OCEANS (*Durch drei Ozeane*). By W. Krawtschenko, for the "Army Review." Berlin: Mittler und Sohn. 1914. Part II, medical. Vol. viii. Pp. 264.

The author states that he was appointed to the medical charge of the cruiser "Isumrud," while she was being got ready at St. Petersburg to form part of Admiral Rojestwenski's fleet; later on in the book he speaks as if he was in the "Aurora."

During the cruise he kept a diary in which he noted daily occurrences of interest; these notes have now been translated at the request of the Editor of the *Marine Rundschau*, and issued in book form.

He gives a good description of the confusion caused by the hurried departure and numerous slight breakdowns. The peeps into life on board the cruiser during the long passage out are most interesting. The account of the battle of Tuschima is written in simple but telling language, and gives us an insight into what the Russian crews had to suffer during those fateful twelve hours. Although the book must, of course, be of more interest to naval than to military men, it is well worth reading.

J. V. F.

Current Literature.

In the Annales of the Pasteur Institute for May, Professor E. Boinet records the treatment of twenty-five cases of typhoid fever with Besreakas' sensitized vaccine.

He selected this vaccine for the following reasons: It causes a rapid and active immunization and produces a large quantity of antibody, augments the bactericidal power of the serum, and increases its content of the specific immune body.

He emphasizes the necessity of commencing the treatment at the earliest possible moment with the reservation that a diagnosis must first have been made. He relies, however, for this diagnosis on the Widal reaction alone, blood culture not being mentioned. In none of the cases, although the vaccine was used in a total dose of 11 c.c., was there any local or general reaction.

The therapeutic effects of the administration of this vaccine were general improvement, lessening of prostration and stupor, and the supervention of a feeling of well-being.

These beneficial results were as a rule manifest after the second or third injection, usually twenty-four to thirty-six hours after, as is shown in tables and temperature charts.

A fall of temperature was as a rule also observed; this fall occurred in some cases on the day of the third injection, in others on the following day.

The vaccine was employed usually in successive doses of 1, 2, 3 and 4 c.c., amounting to 9 to 11 c.c. in all, injected on four to six successive days.[1] It is here again emphasized that the treatment should be begun at the earliest possible moment, if possible between the sixth and tenth days of the fever.

Not only did this vaccine therapy shorten the course of the fever and render this less grave, but it also tended to diminish the extent of the ulceration of the intestine and likewise lessened the liability to other complications.

Of the twenty-five cases four died, in the others the average duration of the fever was 26·4 days. A short relapse occurred in five out of the twenty-five cases. No symptoms of cholecystitis were noted in any of the cases.

Baths at 28° C. were also used in the routine treatment of the cases; these were repeated every three hours when the temperature rose above 39° C.

Of the four fatal cases two did not receive their first dose of vaccine until the sixteenth and twenty-first days respectively. One was a case of extreme toxæmia, and the last lived until the fifty-ninth day and died from septic abscesses (staphylococcus). The author believes that if larger doses of the vaccine had been given this case also might have been saved.

D. H.

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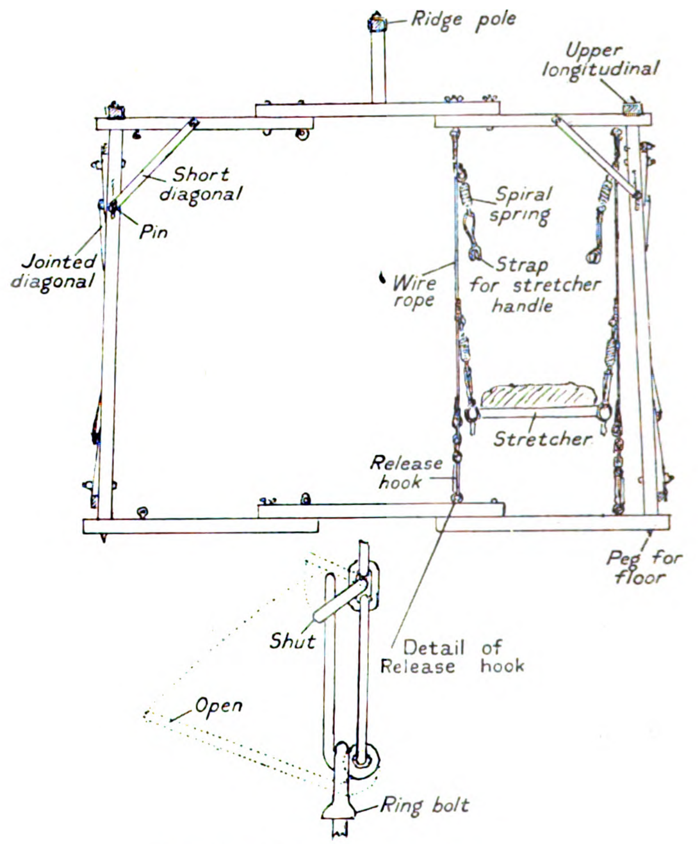
[1] It is difficult to say what 1 c.c. of sensitized vaccine represents in terms of number of bacilli. As a rule the vaccine is prepared by emulsifying the growth on an agar slope in 1 c.c. of saline; this emulsion is then mixed with a sufficiency of immune serum, and after being left in contact for some hours it is centrifuged, the deposit washed and suspended in 10 c.c. saline. 1 c.c. of this would therefore contain $\frac{1}{10}$ of the growth on an agar tube.

A New Frame to Carry Stretchers in Trains or in Wagons.—In the *Deutsche Kolonnenführer* for March 1, 1914, there appears an illustrated description of an ingenious frame invented and patented by Karl Schwartz. It is made to take four stretchers, two on either side, and there is sufficient room for an attendant to get between them. Two such frames can be connected by a ridge pole.

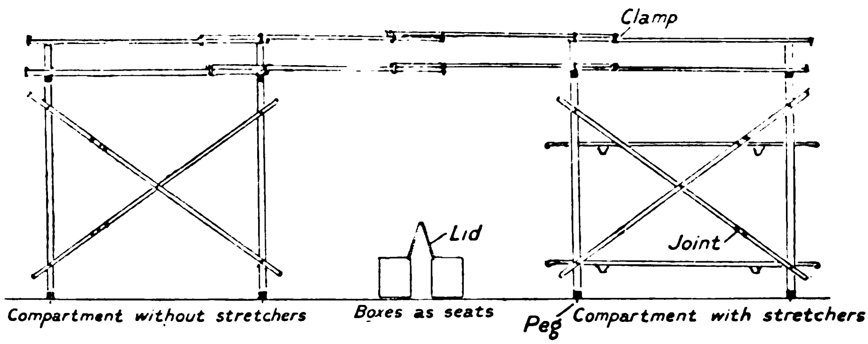
A tarpaulin can be thrown over the frames, and a tent is thus formed. The apparatus can be fixed up in railway goods vans, or one frame can



End view of Schwartz frame (not to scale).

be fitted on to a motor or other lorry. The poles and sections of the frame can be taken to pieces in a few minutes, and they all pack into a wooden chest, which, when empty, can be used as a bench, the lid of the box forming a back rest. The details of construction are fairly visible in the photographs reproduced in the article. The apparatus is a wooden structure, made up of many pieces (the longest of which look about six feet long), which, to build up the frame, are joined by bolts and nuts.

There are longitudinal pieces of square section, grooved at the sides, which can be clamped together so as to run the whole length of the frames which connect the uprights at the top. One of these forms a ridge pole. There are lateral diagonal cross-pieces to each half, and short transverse diagonals at the upper corners to give longitudinal and transverse rigidity respectively. Most of the pieces are numbered to facilitate the building-up of the frame. The compartment formed by each frame carries two series of stretchers in two tiers, with a gangway



Side view of Schwartz apparatus, ¼ inch to 1 foot (height is exaggerated).

rather less in width than a stretcher. The stretchers are suspended through the medium of spiral extension springs from vertical wire ropes fixed to the upper and lower transverse pieces of the frames by cage bolts. When two frames are connected by a ridge pole, the interval between the compartments is about six feet. The accompanying sketches by Colonel James show the general construction of the apparatus. J. V. F.

The French First Field Dressing.—A War Office circular issued at the beginning of the year called upon principal medical officers of Army Corps areas to report on the present first field dressing with reference to its disadvantages, what modifications could be made, and by what means they could be effected. Medical Inspecteur Salle of the 6th Army Corps called on all the medical officers under his command for their views, and the various points brought forward by these officers have been compiled in an article which appears in the *Archives de Médecine et de Pharmacie Militaires* for April, 1914. The conditions to be aimed at are:—

The dressing must be as light as possible, the soldier is already overloaded. It must be thoroughly protected from all kinds of dirt and infection, and must remain serviceable for an indefinite period. It must be capable of being easily applied, and in such manner that the dressing does not become contaminated by the hands of the person applying it. It must be capable of completely covering a wound and of being fixed so that it does not slip. And, lastly, it must be dry, absorbent, pliable, and sterile. The present dressing presents the following disadvantages:—

(*a*) The outer covering is opened with difficulty, and it, as well as the label, gets damaged too easily.

(*b*) The dressing in its inner cover cannot be extracted with sufficient ease.

(*c*) It is often difficult to pull the gummed edges of the inner cover apart. This necessitates tearing, and consequent contamination of the dressing by the fingers.

(*d*) There is too much risk of the component parts of the dressing falling to the ground on opening the packet or when applying the dressing.

(*e*) It is difficult to divide the dressing in cases of double wounds.

(*f*) The dressing is not sufficiently absorptive, and its antiseptic properties are doubtful.

The article discusses each item in the packet most exhaustively, and the general conclusions arrived at were that: The packet should be rectangular, measuring 10 cm., and weighing about 50 grm. It should have three covers; the outer cover to be made of strong cloth, coloured grey or catechu, which should be sewn on three sides with thread, which can be easily torn, a large stitch being opposite the centre of the long margin to allow of a finger being inserted under the thread. The word "pull" to be stamped here. It has also been suggested that the outer cover should be in the form of an envelope. The inner cover to be made of parchment-paper or of impermeable cloth, with gummed edges, which can be easily opened. Two identical dressings, each wrapped in filter paper, and consisting of a piece of tow or absorbent wool (10 by 10 cm.) enclosed in a layer of gauze and folded in two with a bandage 3 m. by 8 cm., attached at about 10 cm. from its end. The other end of the bandage should be slit up for about 30 cm. A red or black mark on the outside should show the men what portion of the dressing they may touch. A gauze compress of four layers might be included in the folded dressing, to be used if necessary to clean the surroundings of the wound (to be used by medical officers only). The dressing should be aseptic. Each soldier should carry the dressing in a special pocket at the height of the chest inside the coat. The pocket should have a waterproof lining. J. V. F.

Instructions for Kitchen Administration. (*Vorschrift für die Verwaltung der Truppenküchen*).—This recently published official German manual is reviewed in the *Deutsche militärärzt. Zeitschrift*, April 20, 1914, as far as the medical service is concerned.

A medical officer is on the kitchen administration staff. He and the president, the captain commanding the company, fix the menu. The messing funds have to pay for and maintain meat baskets with movable tin linings. Any articles of food of doubtful quality are examined in the laboratories. The medical officer will at least once a month work out the caloric value of the diets by striking an average of the fare for several days, and his finding will be entered in the messing-book.

During the epidemics and on other special occasions the medical officer may make recommendations to the officer commanding the battalion for altering the diet scale. The kitchen personnel are subjected to a careful medical examination before taking over these duties; they attend the monthly health inspections, and must have a weekly bath, when they are to use soap freely. Two towels are to be kept in the kitchen for the inspecting medical officer. The medical officer will frequently inspect the food before issue.

Appendices to the manual contain notes for guidance in detecting food adulterations, the outlines of contracts, etc., the caloric values of the more important foods, hints on cooking, book-keeping and meat inspection. J. V. F.

The Treatment of Wounds with Karlsbad Salts. Stabsarzt Dr. Posner, in the *Deutsche militärärzt. Zeitschrift*, April 20, 1914, describes a method of treating granulated wounds, with which he has had great success during the last eighteen months, viz., with Karlsbad salts.

The salt absorbs a quantity of the wound secretions and allows the wound to granulate more rapidly. A septic wound which with moist or spirit dressings has been brought to a state in which only a small amount of suppuration is occurring is the stage at which this method of treatment should be adopted.

He recommends its use in operation wounds healing by granulation, in injuries of all kinds, especially in burns, infected gunshot wounds, open boils, leg ulcers, etc. It sometimes causes a little smarting when first applied. The wound is dusted with the finely powdered salt, which is not sterilized, and covered with a dry dressing. Sodium sulphate (glaubersalz) is equally efficacious. The advantages he claims are that Karlsbad salts are very cheap, there is a saving in dressings (which only need changing every three or four days) and the time under treatment is shortened. J. V. F.

Impressions and Observations in the Second Balkan War. (*Eindrücke und Boobachtungen vom griechischbulgarischen Kriege*).—The *Deutsche militärärzt. Zeitschrift* for May, 1914, reproduces a lecture given by Stabsarzt Dr. Otto to the Army Medical Society in Berlin, on his experiences in the Balkan War. He was employed in one of the hospitals at Salonica, and later in a reserve hospital at Athens; he also had some experience on the hospital ship "Albania." At Salonica there were altogether sixteen hospitals, in schools, palaces and other large buildings. They were all well equipped and organized. Wounded reached Salonica by rail and were distributed to the hospitals in automobiles. They usually arrived at night. In most cases they were washed and fed, and dressings were left till after the wounded had had a rest. The lecturer frequently noticed that after one night's rest men who looked frightfully ill on admission were ever so much improved by the morning.

After the Greek advance into mountainous country the evacuation of wounded became very slow, wounded having to be hand-carried long distances. Motor wagons used for bringing up supplies and ammunition were very useful in bringing back wounded.

In the last big battle, in which the Greeks had 6,000 wounded, the evacuation along the narrow-gauge railway was further delayed by the necessity of bringing up fresh troops, and it took ten to fourteen days before the last wounded reached Salonica. The Greek army apparently had no field hospitals, only bearer companies, and the want of the former was much felt. There were two well equipped hospital ships to evacuate wounded to the home territory; only cases who would not be fit for duty within three weeks were sent home. Others were sent to Patras, Volos or Corfu.

The lecturer accompanied the "Albania" on one of her trips. The medical officer in charge spent most of the time during the voyage in adjusting dressings which had got loose. The diagnosis tallies on the patients had no entry on them regarding the treatment of the wounds and suggestions for renewals—which made the work more difficult.

With regard to cholera protection inoculation was of great use. It afforded protection to seventy-five per cent of the cases, but there were deaths recorded after two or even three inoculations. When peace was declared over 200,000 men had been inoculated. The authorities were at first rather afraid of inoculating the troops at the front on account of the after-effects and the attendant risk of diminishing their fighting powers, but the great moral effect of the inoculation was very soon realized. Men who got diarrhœa were no longer frightened out of their wits. The vaccine used at first was obtained from Dresden and Berne. A 30 c.c. flask cost five francs; after a while the vaccine was made locally in Greece by Professor Saras and only cost about threepence for the same quantity; 40 kg. of vaccine was prepared every day, enough for about 27,000 men, and it was done up in 30, 20, and 10 c.c. tubes. The inoculations were effected at intervals of about eight days, and the local reaction was usually only slight.

In the Queen's II and III hospitals about 400 cases were treated; 51 per cent of the wounds were due to small arm and 27 per cent to shrapnel fire. In other hospitals the percentage of shrapnel wounds was higher; one observer estimated it at 70 per cent. It was not rare to see a case who had as many as ten shrapnel wounds. About 41 per cent of shrapnel bullets remain in the wound.

On the whole, cases coming to hospital showed that they had been properly and well treated on the battlefield. The writer did not see many cases come in that had been treated with mastisol; he thought those treated with iodine made the best impression, although there were some cases of eczema.

Most of their cases were wounds of the extremities. The lecturer commented on the large number of flesh wounds of the calf. In his hospital, which was really meant for severe cases, 9 per cent. of the wounds were of the calf. He mentions one hospital which received forty cases of wounds of the calf in one day. From inquiries made it would appear that the majority of these wounds were received when the men were in the prone position. Most of them were complicated with a hæmatoma and many were infected, the worst cases being those in which the hæmatoma had been incised at the front. The treatment was usually very tedious, frequent incision being necessary. Splints and elevation of the limb appeared to be the best treatment. After the wounds were healed, pain and discomfort on walking usually continued for a long time. Many cases took longer to recover than complicated fractures.

Dr. Otto is of opinion that infection would not have occurred in many cases if a splint had been applied to keep the gastrocnemius at rest. He quotes other observers on the Turkish side who also noticed the large number of wounds of the calf, and he suggests that stretcher-bearers and dressers might with advantage be taught to treat such wounds like fracture, i.e., to put the leg in splints.

Very good results were obtained in fractures of the thigh by means of extension with sticking plaster. Splinters were left in position as far as

possible; consolidation of the bone appeared to be rather quicker in these cases than in simple fractures for the reason that the periosteum is usually not so much damaged. The lesson to be drawn from this is to get fractures of leg bones into a good hospital as soon as possible so that extension treatment may be started without delay. Most cases treated with plaster of Paris showed considerable shortening.

Large numbers of penetrating wounds of the hand were observed, with the wound of entrance on the palm surface; these were probably inflicted during rushes forward. Both wound of entrance and exit were large.

The lecturer quoted a number of interesting cases of wounds of other regions which came under his observation. His conclusions with regard to gunshot wounds of the skull are that they should be evacuated as soon as possible and be operated on early under the most favourable circumstances, as they also require a very careful after-treatment. He saw many cases in Athens in which fistulæ and abscess formation occurred. If the wound is infected, trephining at the front will only make matters worse, especially if suitable after-treatment is not available, and the possibility of uncomfortable evacuation has to be considered. If the brain is left untouched in its shell the infection will remain stationary, a local abscess may form at the worst, but the patient will travel better if he has not been operated on. The earlier the evacuation can take place the better; simple dressing at the front alone is indicated. J. V. F.

Extract from the "Military Surgeon," vol. 34, p. 585, June, 1914.—"Major W. J. L. Lyster has invented a device for the purification of drinking water for troops in the field, which has been adopted by the military establishment. It consists of a canvas bag weighing about six and a half pounds and with a capacity of thirty-eight and a half gallons. At the base of the bag faucets are fitted which enable the filling of canteens without delay. It is proposed to dissolve in the water contained in this bag fifteen grains of hydrochlorate of lime. This renders the water sterile in five minutes, and one of the bags supplies drinking water for a company of the full war strength of one hundred and twenty men. This method of sterilization, while not new, has been adapted to military use by Major Lyster, and is much less bulky and expensive than the excellent filter devised by Major Carl R. Darnall."

Reduced Railway Fares for Members of German Red Cross Societies.—In the *Deutsche Kolonnenführer* for February 15, 1914, there appears an interesting article on the regulations which have been drawn up by the German Central Red Cross Committee and the railways for providing cheap travelling facilities for the various Red Cross formations when attending drills, etc., or when called out for duty in emergencies.

Second-class tickets at half-price or third-class tickets at military rates are issued to:—

(*a*) Members of various Red Cross Societies (freiwillige Sanitätskolonnen, Samaritervereine von Roten Kreuz and Genossenschaft freiwilliger Krankenpfleger im Kriege von Roten Kreuz) when travelling to such meetings and practices as are approved of by the territorial delegates.

(*b*) Members of the above when proceeding on duty to places where accidents, etc., have occurred.

(*c*) Members of committees of the various organizations travelling to inspect First Aid Depots.

Tickets are issued by the railway in exchange for warrants. These warrants will be issued by commandants of Red Cross units, and should have the following information filled in:—

Name and appointment.

Cause of journey and destination.

Class.

Period for which ticket available.

The particular gathering which is being attended. The article contains instructions with regard to baggage, stopping of trains, etc.

Arrangements can be made with postal and telephone offices for calling out Red Cross units in emergency; at the central telephone office a list of the members is kept, and, on the call being given (Sanitätsalarm), the telephone office notifies the various members concerned. This effects a considerable saving of time.

Arrangements for sending sick by train at reduced fares are also detailed in this article. J. V. F.

Two Months in Servia during the Second Balkan War (*Le Caducée*, April 4, 1914).—Bourquin, in the *Revue médicale de la Suisse Romande*, February 20, 1914, describes the work of the medical men sent by the Swiss Red Cross Society to Servia. He points out that in modern wars the number of wounded exceeds the number of sick, and thinks that increased precision of modern arms combined with improved hygienic conditions, are responsible for this change. Hospitals got rapidly filled with wounded; often two had to lie in one bed, and the corridors were filled with additional beds.

The writer was much struck by the number of infected wounds; in his experience at least thirty per cent of small arm wounds were infected. He attributes it to dirty clothing. He is in favour of antiseptic as well as aseptic dressings. Results obtained by the use of silver preparations, such as collargol, were not better than other methods; his favourite lotion was peroxide of hydrogen. He preaches conservative treatment, and holds that many cases which at first look as if amputation were urgently required get all right with waiting. He advises to wait, but to amputate at once as soon as symptoms of septicæmia set in.

Their abdominal cases did well on complete rest and starvation. They lost very few cases from peritonitis. The cases of trephining did not do well on the whole; this he attributed to the improvised surgery, want of sisters, and the number of infected wounds which had to be dressed in the same theatre.

The writer was very pleased with the Servian organization; all cases arrived with a first field dressing applied. As far as he knew, no case remained over twelve hours on the battlefield without receiving medical attention. The hospital trains ran regularly. He estimated the death-rate of their wounded at ten per cent. J. V. F.

Impressions and Experiences at Adrianople from the Point of View of the Physician ("Eindrücke und sanitäre Erfahrungen aus Adrianopel vom Standpunkte den Internisten"). *Militärärzt*, June and July, 1914.—Regimentsarzt Dr. Karl von Müllorn gave a lecture before

the Army Medical Society in Vienna, in February last, on his experiences at Adrianople during the Balkan War, and it has been reproduced in the *Militärarzt*. He describes the bad sanitation of the town and shows how well it was suited for the development of infectious disorders.

The lecturer got some of his information regarding the inner history of the garrison from Dr. Behaeddin Bey, who was in charge of the Red Crescent Hospital. In the first part of the siege there was comparatively little infectious disease although the garrison was about 60,000 strong, and the civil population much increased by the addition of numerous refugees. Food was fairly plentiful at first, although the bread ration of the Turkish soldier gradually fell from 900 to 700 grm.

Towards the end of December, 1912, the first case of cholera was introduced by a Bulgarian prisoner, who became the contaminating focus. While newspaper reports were probably exaggerated, the Turkish returns of fifty-five cases of cholera with thirty deaths up to the fall of Adrianople (March 26, 1913) probably are at too low a figure.

During the second period of the siege the sanitary condition got worse and worse. The water supply was cut off, cold weather supervened, and the food supplies diminished although 5,000 tons of grain had been stored in the town in October. The soldier's bread ration dropped to 250 grm. per diem, but a mutton ration could be issued daily. In February 200 horses were slaughtered for want of forage and actually buried. They had forgotten to lay in a supply of salt, so that after a while bread had to be baked without salt and an issue of cheese was made instead. The civil population fared worse, and the price of foodstuffs rose enormously, e.g., 50 kg. of flour fetched 190 kr., 1 kg. salt 25 kr., &c. Flour was mixed with other meals to make it go further. All this contributed towards infective diseases and gastro-intestinal disorders.

No improvement took place after the fall of the town; in fact, the Serbo-Bulgarian army brought a whole lot of infectious disorders into the town with them. Food supplies in sufficient quantities could not be introduced owing to the railway bridge over the Arda being damaged.

The lecturer impressed on his audience that although the hospitals were all full, the wounded only formed a small percentage of the total. He then briefly described the hospital arrangements, and, amongst other things, offered the interesting information that men who had been shot through the lungs all stated that they did not feel their wounds at all at first, and only became aware of being wounded by seeing blood or coughing up blood, or by finding their respirations painful. Most of those who had been shot in the abdomen said that a dull pain in the abdomen made them aware that they had been hit.

He then described some of the more frequent infectious diseases they had to treat; he stated that all varieties were represented except plague.

In describing the hospital accommodation and attendance he enlarged on the importance of having a well-trained personnel, that discipline and training could not be replaced by good intentions and willingness on the part of men who had little or no training.

With regard to voluntary aid, so much had already been said that he thought it unnecessary to allude to the matter, but he would like to emphasize the importance of practical training. Those volunteer nurses who had first had a training in surgical work and were then turned to medical work, always had a hankering to get back to surgery. In the

one case they have the care of helpless sick and in the other there is the almost daily exhibition of exciting operations. While it is only right that these women should get accustomed to the sight of operations, etc., it is far more important that they should learn right at the beginning what the real task is that awaits them—that of nursing serious cases of illness and where a bandage is quite the exception. The lecturer maintained that only ten per cent of all their (Austrian) volunteer nurses would stick to their job (*sich bewähren*) under actual conditions of war. This, of course, is exclusive of the class of woman who says: "But I am not here to look after serious cases of illness," which actually occurred in the lecturer's experience at Adrianople.

He mentioned the difficulties they occasionally experienced through lack of important drugs and vaccine lymph; the shortage of pharmacists, so that medicines prescribed to-day could not be issued till to-morrow; the shortage of medical men, who in some hospitals were unable to see all their cases once a day.

The lecturer went on to describe a cholera hospital in wooden huts. No notice was placed anywhere to indicate the nature of the hospital. The floors and passages of the huts were sprinkled with lime; dejecta were treated with sublimate, collected and thrown into a pit and covered with lime. He spoke well of the intravenous treatment with hypertonic salt solution; but here also he was impressed by the bad training of the personnel; he saw attendants eating bread in the wards and attending to their duties at the same time. He was agreeably surprised, on accepting an invitation to dine with a Bulgarian artillery regiment, to find all the dishes served up piping hot, the bread steaming, and all the plates dipped in boiling water before being placed on the table. The colonel explained that he had taken these steps since one of his officers had succumbed to cholera.

It is interesting to note that when the Bulgarians ran out of most anti-diarrhœa drugs, on the advice of a Russian doctor they treated their cases with cognac, with the addition of a few drops of tincture of iodine, which treatment Professor Krauss is said to have recommended later.

The lecturer then dwelt for a few moments on the horrors of the Serai Island, where the Turkish prisoners were segregated.

The following disabilities alone disqualified for service in the Bulgarian Army:—

(1) Advanced malignant new growths.

(2) Extensive scars of the lower extremities which rendered walking impossible.

(3) Complete paralysis of the extremities and hemiplegia.

(4) Advanced tumour albus.

(5) Complete ankylosis of the knee, hip or shoulder joints.

(6) Caries and necrosis of the extremities accompanied by bone changes rendering locomotion almost impossible.

(7) Mental diseases if chronic or incurable, but not epilepsy.

(8) Blindness in both eyes.

(9) Advanced tubercle of the lungs.

(10) Loss of hand, forearm or arm.

(11) Loss of four fingers.

(12) Complete ankylosis of the fingers of either hand.

(13) Loss of a foot, leg or thigh.

(14) Shortening or deformity of the lower extremity rendering locomotion impossible without crutches.

It was for this reason that the Bulgarians were able to put so many men into the field.

The lecturer then described how little the Bulgarians did towards clearing up the battlefield after the capture of Adrianople.

On July 11, the Bulgarian Field Hospital at Dedeagatsch was transferred to Adrianople as a bombardment by the Greek fleet was expected. On the 12th, on account of faulty administration and in spite of the rumours of a Turkish advance, the Austrian Red Cross hospital train was sent away empty, after waiting six hours, although all the hospitals were full. In spite of continued reports of the advance of the Turkish troops no arrangements were made to get rid of the sick and wounded. The Austrian Red Cross Mission were put off with reports of one kind or another. On the night of the 19th they heard trains arriving and departing from the railway station situated at some distance, and thought that reinforcements were arriving, whereas the Bulgarians were actually clearing out as fast as they could, the sick being bundled out half dressed as best they could manage. The Bulgarians later set fire to the supply stores, railway station, etc.

The Austrian Red Cross Mission continued to look after the sick and wounded left behind, and were assisted by the Agram Sisters of Mercy. On the 22nd the Turks re-entered Adrianople, and a few days afterwards the Austrians were sent by train to Constantinople.

The great lesson which the lecturer drew from his experiences in the Balkans was that good physicians and bacteriologists are as important in a campaign as good surgeons, and that if a well-organized and well-equipped medical service costs a lot of money it is capital well laid out and carries with it large interest. J. V. F.

Correspondence.

THE TRANSPORT OF WOUNDED IN WAR.

TO THE EDITOR OF "THE JOURNAL OF THE ROYAL ARMY MEDICAL CORPS."

Sir,—May I, as an absentee, be permitted to make a few remarks on a paper on the above subject read before the United Services Medical Society.

This subject is of great importance to all of us, and beginners in staff work naturally regard lectures given before the United Services Medical Society as an authoritative guide to the plans they would be expected to make at war games, staff tours, etc.

There is a general tendency in our ranks to regard medical arrangements in war in a detached fashion; to place our own needs, views, and desires first, as dictating the lines on which these arrangements should be cast. Now in approaching any set of medical arrangements made for warlike purposes the paramount considerations should always be military

ones. Our plans should be made with a full knowledge of the military needs they are intended to fill and with a complete comprehension of the limiting influences which war and the particular military situation impose. Unless we do this we can only expect our plans to be altered or ruled out as impossible by the ruthless hands of the G.O.C. or his staff.

The military considerations which govern the collection of wounded are shortly referred to in a letter from the writer in the February number of this Journal, p. 245. The question of motor transport is also there referred to.

As regards the question of substituting motor ambulance wagons for horsed wagons in field ambulances, we may take it for granted that the General Staff would veto any such proposal at once. A vehicle of the speed and wide radius of action of a motor car, is quite out of place moving with divisions as first line transport. The qualities of speed render it possible to keep such transport far in the rear and bring it up quickly to the front when required. The peculiar virtue of fast mechanical transport, as contrasted with horsed vehicles, is that you can keep the roads clear and yet have the transport there when it is wanted. Another point: motor engineers have not yet produced a machine flexible enough to move continuously without overheating at the slow rate troops march and at another time speed up to twenty miles per hour, say, for the purposes of the rapid transport of wounded.

Take now the military considerations which affect the transport of wounded down the lines of communication, viz., evacuation: transport for ammunition, without which an army cannot fight; transport for food, without which an army cannot live, are two services which will ever be given priority over transport for sick and wounded.

When troops are operating in a friendly country, where roads are numerous and good, where transport is plentiful and only requires the hiring, where a complete network of railways in working order exists, where the rolling stock is more than enough to meet all the calls made upon it, the evacuation of sick and wounded will be found an easy matter to arrange. Under these circumstances the I.G.C. will be found to be a delightful person only too anxious to give you all your reasonable requirements. Transport for your clearing hospitals will be available at your nod; all varieties of ambulance trains will be at your beck and call. In fact, everything will be perfect in the best possible of all wars.

Take now the other side of the picture: roads few and bad, transport scarce, motor vehicles few and perhaps procured with difficulty from far away, even from across the sea; railway lines few or interrupted, bridges broken, rolling stock burnt or otherwise destroyed by the enemy, then the I.G.C. will be found to be an individual as unwilling to give you transport as is the proverbial stone to part with its blood. The evacuation of wounded under these circumstances will not be conspicuous either for its ease or its rapidity. The chief quality then needed in the D.D.M.S. will be patience and a genius for improvisation.

To discuss now some of the individual items in Major Hull's paper, p. 54, lines 19-20. It is no part of the duty of a field ambulance to convoy (i.e., carry and care for on the way) wounded any further back than a medical post established under divisional orders. The rearmost of these would be "the link" referred to in Royal Army Medical Corps training, paras. 188 and 189, and in Field Service Regulations, part ii, section 90 (8) and (10). See also my articles on Staff Tours, para. 15, in the Journal of December, 1912, and in that of September, 1913, para. 22, and the notes thereon. It is there clearly explained how the clearing hospital should be brought into touch with the divisions and who is responsible for creating the means.

It should be remembered as a point in medical tactics that our field ambulances have taken the place of our old bearer companies, and that the clearing hospital is the successor to our old field hospital.

Re page 54, lines 37 *et seq.*, of Major Hull's paper: The channel through which the location of the field ambulances and the wounded they have collected is conveyed to the clearing hospital is the D.M.S., who should be kept constantly informed by the A.D.M.S. of division, where wounded have been collected, and are awaiting evacuation.

There need be no delay in obtaining transport to clear the field if the D.M.S. has made an intelligent forecast of events, and has instructed the D.D.M.S. to prepare accordingly. The statement "If the field ambulances could be cleared rapidly, the problem of transport would be easily solved. The difficulty is to provide adequate transport." Major Hull must forgive us if we find this utterance somewhat cryptic. If he had said, *Given adequate transport, the rapid clearing of the field ambulances would prove easy: the problem is to provide this transport,* we could have followed the sequence. A most important point that Major Hull has omitted to note is that the arrangements made for the routine evacuation of daily sick must be entirely different from those made for the evacuation of wounded expected during and after an engagement. Indeed, he confuses the two on page 57 under heading A. What we all find in working out schemes is that the vehicles of the supply section of the divisional train joining the motor vehicles of the supply column at the refilling point, and so to the railway, are ample for and quite easily used to dispose of the daily sick. The average carrying capacity of the 55 general service wagons of the supply section is 220 mixed cases; that for the 24 three-ton lorries (excluding those specially fitted for bread and meat) is for 288 mixed cases. At the most there will be 60 sick per day. Now, the carrying capacity of these vehicles, even if available, is not nearly equal to evacuate the wounded (800) resulting from, say, 1,000 casualties in a division. Therefore separate and additional transport arrangements must always be made based on a forecast of any fighting and upon an estimate of the numbers of wounded expected. The point to notice is that transport

arrangements are to be made *in anticipation* upon this forecast and estimate, and not to wait, as Major Hull would appear to suggest, until the wounded have actually occurred.

The arrangements must provide for two things. First, to carry away at once all such wounded as they are collected in the preliminary stages of any fight, and before it is known which side is going to win. Secondly, arrangements must be made for transport to clear rapidly the field of action after a victory. If the first be not made, and the field ambulances do not make every effort to collect during the fighting such wounded as the military situation allows, it must follow in case of a defeat that the majority of the wounded will become prisoners of war. If we desire to avoid such catastrophes, we must not copy the French. We must provide means from the inception of any engagement to connect the divisions engaged with the nearest spot on the railway up to which improvised ambulance trains can be brought.

Let us first examine what the railway can do for us. We must remember the following: That the only permanent and fixed post on the military railway system is the *railway regulating centre.* It is here that supply trains are organized, filled and despatched to railhead, whence they return again empty. Railhead itself is not a fixed post, and may be changed from day to day, and may be any distance up to forty miles from the divisions. Daily sick and any wounded evacuated in the empty supply vehicles would naturally have to go to the railhead for supplies, and thence to the railway regulating centre, and there again be transferred to permanent ambulance trains for distribution amongst the various general hospitals. To open a clearing hospital at the railway regulating centre would be pure waste of a unit needed elsewhere. It is therefore advisable to locate one or more stationary hospitals here to open a sort of glorified rest station. These units would provide personnel for medical convoy parties for the supply railway trains, as well as for any improvised ambulance trains; also a series of railhead parties to form railhead rest stations moving as each railhead moves. This would be the organization for dealing with daily sick and any wounded evacuated to the railway in the empty supply vehicles. The clearing hospital is left free and in reserve to advance when required to relieve the field ambulances after a victory, and fulfil its role of "field hospital," opening on the site of a victory.

As before stated, even given full use of the supply vehicles, this means of transport cannot cope with any large numbers of wounded. How is this situation to be met? Either by supplying detachments of the clearing hospital with transport or, by forming a separate column of evacuation or ambulance column, to connect the field ambulances with the railway. The simplest method is to form mobile detachments from the clearing hospital with their own transport, using such vehicles as can be hired in the country of operations or brought up from elsewhere if not locally available. The size of these detachments and the number of

vehicles allotted to each would largely depend on the railway facilities. The further off the railway the fewer to and fro journeys can be made; the more wounded to be carried in any one journey the greater the number of vehicles will be required. In this connection I gather from officers of the General Staff with whom I have discussed the subject that the Director of Railways would—if the railway lines are there and are not interrupted and if rolling stock is available—always be prepared to organize and run a service of temporary ambulance trains from the railway regulating centre to a special railhead or railheads situated as near the site of an engagement, while this is in progress, as the military situation will allow (this may be five to ten miles). That after a victory ambulance trains may quite possibly be brought right up to the field of battle. This, notwithstanding that the railhead for supplies may be forty miles away. These ambulance trains and these railheads would only be organized during periods of hostile contact with the enemy and would be for purely medical purposes. The mobile detachments of the clearing hospitals in this system would take the place of the empty supply column as carriers of wounded to the railway.

A word as to whether we should have mobile detachments from the clearing hospitals, or a separate clearing or ambulance column as a new unit. Either will fulfil the purpose in view, but one or other we must have, otherwise the Medical Service stands to risk failing to carry out the duty upon which it is based, viz., "The rapid evacuation of sick and wounded." Every O.C. of a clearing hospital on mobilization would at once start organizing his command into a main body and detachments. One or more of which he would endeavour to have made mobile to fulfil the before-mentioned duties. Whether or no the personnel would at present suffice is a matter for a practical test. Anyhow it would be much easier to obtain the necessary increase in personnel for the clearing hospital than it would be to obtain sanction for the creation of a new unit. Granting always that it would be much more satisfactory to have a definitely organized clearing column, with its own transport mobilizing with it and upon which we could always count. However the General Staff look askance at new units, especially for administrative troops. Only paramount necessity and a clear demonstration that the problem cannot be solved in any other way, would obtain sanction for the same and its inclusion in the establishment of the expeditionary force.

Major Hull refers often to the "refilling point." As this post is an important one in any scheme of evacuation involving empty supply vehicles a few words on its medico-tactical aspect might be useful.

(1) When troops are on the march the refilling point is fixed *at the head of the area* in which the troops have been billeted or encamped. The supply section of the divisional train connects with the supply column after the troops have marched on. There need be no difficulty in evacuating any sick in the empty supply wagons under these circumstances.

(2) When troops are stationary the refilling point is fixed to be on the ground upon which troops are encamped. The supply column comes right into the camps.

(3) During periods of hostile contact the refilling points are fixed about half a march to the rear of the troops engaged. The baggage and supply sections of the train connect with the troops according as the military situation allows. The use for sick or wounded of empty supply vehicles would be very difficult, often impossible. It is here that the mobile detachments of the clearing hospital running to a special railhead would come in.

(4) In the case of retreats the arrangements for supply are the same as for troops on the march, only everything is reversed.

(5) After a victory the refilling point is brought close up to the troops in occupation of the ground recently fought over. The supply column lorries can then be used to evacuate as many non-serious cases as can be quickly crammed into them. The remainder, with such serious cases as are fit for transport, would be evacuated by the mobile detachments of the clearing hospital, reinforced on this occasion by the lorries used to bring up the main body of the clearing hospital.

It should be noted that *after a victory* would probably be the only occasion on which a clearing hospital would be opened in its entirety. At other times it would be only active through its detachments.

I am unable to follow Major Hull's reference as applied to any feasible scheme, when he states the use of the supply column would differ, whether a clearing hospital be open or closed. The utilization of the supply column for medical purposes depends upon quite other considerations. The supply column, anyhow, would always have to be furnished with a small medical convoy party from the clearing hospital, carried in an extra vehicle or motor omnibus attached to the column. This party would always have to be with it, irrespective of the open or closed state of the clearing hospital.

The view that the clearing hospital is an adjunct and not an essential in any satisfactory scheme for the evacuation of wounded is not orthodox, and beginners should be warned against acting upon it. For instance until the nucleus of a clearing hospital was given to the Territorial Medical Service, one of the chief difficulties and most important points in working out schemes for Territorials was the creation of arrangements to supply the function of a clearing hospital; one could not get on without it. This unit is certainly the pivot upon which all our arrangements for evacuation turn, without it we should be paralysed. At one time the clearing hospital will be working through its detachments; at another open on the field after a victory; at another packing up for a future effort. We may prophesy, however, that the O.C. Clearing Hospital will be one of the hardest worked individuals in any of the administrative services, and upon his activities much will depend.

S. H. Fairrie,
Major R.A.M.C.

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THE TRYPANOSOME CAUSING DISEASE IN MAN IN NYASALAND.

PART III.—DEVELOPMENT IN *GLOSSINA MORSITANS*.

BY SURGEON-GENERAL SIR DAVID BRUCE, C.B., F.R.S.; MAJOR A. E. HAMERTON, D.S.O., AND CAPTAIN D. P. WATSON, R.A.M.C.; AND LADY BRUCE, R.R.C.

INTRODUCTION.

IN previous papers[1] the morphology of this trypanosome and the susceptibility of various animals to its pathogenic action have been described. In this is given an account of its development in *Glossina morsitans*.

In Uganda the study of the development of *Trypanosoma gambiense* in *G. palpalis* was much assisted by the circumstance that large numbers of laboratory-bred tsetse-flies were available. This was due to the fact that the pupæ of *G. palpalis* could be collected on the lake-shore in practically unlimited numbers. It is quite otherwise with *G. morsitans*. It has been found impossible to find the pupæ of this species in any numbers, so that all laboratory-bred *G. morsitans* have had to be hatched out of pupæ obtained from captive flies, a slow and laborious process. The flies are caught some twenty to thirty miles from the laboratory and brought up to Kasu camp by a native on a bicycle. This kills a large number of the flies. Moreover, the climatic conditions at the

[1] *Proc. Roy. Soc.*, B, vol. lxxxv (1912), and B, vols. lxxxvi and lxxxvii (1913).

camp are not always favourable for breeding and hatching out. This was remedied to some extent by establishing a breeding station down in the low country, but as this had to be left in the charge of natives the results were not always very satisfactory.

The study of the development of this trypanosome in *G. morsitans* has therefore been rendered difficult by the small number of laboratory-bred tsetse-flies which could be obtained. Over and above that, flies bred from captive flies are not so strong and healthy as those hatched out from wild pupæ.

An attempt was made to use wild flies by feeding batches of about twenty on healthy animals and picking out those cages which did not give rise to infection. But this is at best a roundabout and clumsy method, as it can never be certain, although every care is taken, that only clean flies are being dealt with.

The Development of the Trypanosome causing Disease in Man in Nyasaland in *G. morsitans*.

Eleven experiments were carried out with laboratory-bred flies. Three were positive and eight negative.

Five experiments were also carried out with wild flies, as no laboratory-bred flies were available. All were positive.

TABLE I.—Laboratory-bred Flies.

Date	Expt.	Number of flies used	Experiment positive or negative	Number of infected flies found	Number of days before flies became infective	Temperature at which flies kept
1912						
May 22 ..	563	18	−	0		
June 13 ..	668	22	−	1		
July 15 ..	879	22	−	7		
,, 29 ..	1,003	28	+	2	31	84° F. (29° C.)
Aug. 17 ..	1,072	27	−	3		
Oct. 23 ..	1,494	22	−	3		
Nov. 6 ..	1,560	19	−	0		
Dec. 13 ..	1,686	24	−	2		
,, 23 ..	1,710	30	−	0		
,, 30 ..	1,723	35	+	3	14	84° F. (29° C.)
1913						
Aug. 31 ..	2,405	30	+	4	23	84° F. (29° C.)

Tables I and II show these sixteen experiments: the number of flies used; the number of infected flies found on dissection; and the number of days which elapsed before the flies became infective. As each fly died it was dissected and the result noted. As will be seen from Table I, several infected flies were found in the negative

experiments. This probably means that the flies were only infected, not infective. The number of days before a fly becomes infective is arrived at by deducting seven days from the number of days which elapsed between the first infected feed of the flies and the appearance of trypanosomes in the blood of the experimental animal. Seven days is put down as the average number of days between the infection of the animal and the appearance of the trypanosomes in its blood—the incubation period. It is probably a day or two shorter.

TABLE II.—WILD FLIES.

Date	Expt.	Number of flies used	Experiment positive or negative	Number of infected flies found	Number of days before flies became infective	Temperature at which flies kept
1912						
Dec. 11 ..	1,680	80	+	8	18	84° F. (29° C.)
,, 13 ..	1,688	40	+	6	3	84° F. (29° C.)
,, 18 ..	1,705	45	+	7	1	84° F. (29° C.)
1913						
Jan. 9 ..	1,748	70	+	1	25	84° F. (29° C.)
,, 14 ..	1,729	20	+	1	30	84° F. (29° C.)

The number of flies used in each experiment was small, due to the difficulty of obtaining laboratory-bred flies. They were kept during the experiment in the incubator at a temperature of 84° F. (29° C.).

In Experiment 1,723 the number of days which elapsed before the flies became infective was only fourteen. This number is obtained, as mentioned above, by deducting seven days for the incubation period, but this may have been a day or two less. The flies were kept at an evenly warm temperature, which would tend materially to shorten the period of development. Still, fourteen days seems a short time to elapse between the first feed on the infected animal and the appearance of an infective fly in the cage.

Two hundred and eighty-seven laboratory-bred flies were used and twenty-five infected flies were found—8·7 per cent.

Experiments 1,688 and 1,705 are evidently cases of infection by naturally infected wild flies which had escaped detection. They are included in the table as they both show invasion of the salivary glands, and so help to throw light on the mode of development of this trypanosome in *G. morsitans*. The other three passed through an interval of eighteen, twenty-five, and thirty days before the cages became infective. These are probably cases where there was

no naturally infected fly in the cage, and these periods therefore represent the usual length of time required for the cycle of development of this trypanosome to take place in *G. morsitans*. The wild flies were also kept in the incubator at a temperature of 84° F.

Two hundred and fifty-five flies were used, and twenty-three infected flies were found—9 per cent.

Details of the Eight Positive Experiments.

The following table gives the details of the eight positive experiments :—

TABLE III.

Expt.	Day of experiment	Procedure	Remarks
1,003	1—2 3 4—41	Flies fed on infected dog. Starved. Fed on clean Monkey 1023.	Trypanosomes appeared in blood of Monkey 1023 on the thirty-eighth day.
1,723	1—4 5 6—22	Flies fed on infected dog. Starved. Fed on clean Monkey 1733.	Trypanosomes appeared in blood of Monkey 1733 on the twenty-first day.
2,405	1—6 7 8—32	Flies fed on infected monkey. Starved. Fed on clean Monkey 2410.	Trypanosomes appeared in blood of Monkey 2410 on the thirtieth day.
1,680	1—2 3 4—22	Flies fed on infected dog. Starved. Fed on clean Dog 1708.	Trypanosomes appeared in blood of Dog 1708 on the twenty-fifth day.
1,688	1—2 3 4—12	Flies fed on infected monkey. Starved. Fed on clean Monkey 1699.	Trypanosomes appeared in blood of Monkey 1699 on the tenth day.
1,705	1—2 3 4—9	Flies fed on infected monkey. Starved. Fed on clean Monkey 1707.	Trypanosomes appeared in blood of Monkey 1707 on the eighth day.
1,748	1—2 3 4—30	Flies fed on infected monkey. Starved. Fed on clean Monkey 1845.	Trypanosomes appeared in blood of Monkey 1845 on the thirty-second day.
1,729	1—2 3 4—38	Flies fed on infected dog. Starved. Fed on clean Dog 1767.	Trypanosomes appeared in blood of Dog 1767 on the thirty-seventh day.

Omitting Experiments 1,688 and 1,705 it would appear from the remaining six experiments that an average period of twenty-four days is required to complete the cycle of development of the trypanosome causing disease in man in Nyasaland in *G. morsitans*, the flies being kept at a temperature of 84° F.

Details of the Eight Negative Experiments.

The following table shows the method of procedure in carrying out the eight negative experiments :—

TABLE IV.

Expt.	Day of experiment	Procedure	Remarks
563	1—3 4 5—52	Flies fed on infected monkey. Starved. Fed on clean Monkey 594.	All flies negative on dissection.
668	1—2 3 4—63	Flies fed on infected dog. Starved. Fed on clean Dog 699.	One infected fly found on the forty-second day.
879	1—2 3 4—32 33—63	Flies fed on infected monkey. Starved. Fed on clean Monkey 910. Fed on clean Monkey 1073.	Seven infected flies found.
1,072	1—3 4 5—54	Flies fed on infected dog. Starved. Fed on clean Dog 1148.	Three infected flies found.
1,494	1—3 4—5 6—44	Flies fed on infected monkey. Starved. Fed on clean Monkey 1514.	Three infected flies found.
1,560	1—3 4 5—37	Flies fed on infected monkey. Starved. Fed on clean Monkey 1581.	All flies negative on dissection.
1,686	1—4 5 6—43	Flies fed on infected monkey. Starved. Fed on clean Monkey 1704.	Two infected flies found.
1,710	1 2 3—47	Flies fed on infected dog. Starved. Fed on clean Monkey 1718.	All flies negative on dissection.

Result of the Dissection of the Infected Flies.

All the flies dying during the progress of these experiments were dissected.

In the three positive experiments with the laboratory-bred flies nine infected flies were found. The following table gives the results of the dissection of these nine flies. The second column gives the number of days which elapsed between the fly's first infected feed and its death and dissection. In the third column the labial cavity and hypopharynx are included under "Proboscis." At the time these experiments were made no attempt was made to distinguish between the two parts, as has been done lately in the

case of *T. simiæ*.[1] When the proboscis is marked positive, as in Table VI, it may be that the trypanosomes are contained in the labial cavity or the hypopharynx, or in both.

In the development of *T. gambiense* in *G. palpalis* trypanosomes were never noted as occurring in the proboscis.[2] In this species they are noted on several occasions as occurring in this position, but only in the wild-fly experiments, not in the laboratory bred. It seems natural to expect that if the salivary glands are swarming with trypanosomes some of them will sometimes appear in the hypopharynx; and, moreover, in the wild flies some of the infections of the proboscis are no doubt due to *T. pecorum*, *T. simiæ*, or *T. capræ*, all of which develop in the proboscis.

TABLE V.—Laboratory-bred Flies. Result of the Dissection of the Infected Flies found in the Positive Experiments.

Expt.	Time, days	Proboscis	Proventriculus	Fore-gut	Mid-gut	Hind-gut	Salivary glands
1,003	33	–	..	..	+	..	–
1,003	39	–	..	..	+	..	?
1,723	30	–	+ +	+ +	+ +	+ +	–
1,723	30	–	+ +	+ +	+ +	+ +	–
1,723	48	–	–	–	–	–	–
2,405	32	..	..	..	+	..	–
2,405	33	–	+ +	+ +	+ +	+ +	+ +
2,405	33	–	–	+	+	+	–
2,405	33	–	–	+	+	+	–

In Experiment 1,003 two infected flies were found. The first had only a gut infection and, unfortunately, it was found impossible to dissect out the salivary glands of the second. Neither had an infection of the proboscis.

In Experiment 1,723 three infected flies were found. The first and second had the alimentary tracts swarming with flagellates, but none in the salivary glands. The third was found on dissection to be free from trypanosomes throughout. This is curious because this fly had been isolated in a glass tube as an infective fly, and had, when used alone on a rat and rabbit, infected both these animals. The fly remained alive in the tube for thirteen days, and the only explanation that can be given is that in this case the trypanosomes disappeared absolutely from the fly some few days before its death. This was the first time this had been observed

[1] *Proc. Roy. Soc.*, B, vol. lxxxvii, p. 59 (1913).

[2] *Ibid.*, B., vol. lxxxii (1910).

to take place, and it was thought to be a remarkable phenomenon and difficult to credit, until another example of the same kind was observed. It must, therefore, be held as probable that an infective fly, with presumably both salivary glands and alimentary tract swarming with trypanosomes, can lose all these flagellates and become non-infective.

In Experiment 2,405 four infected flies were found. Three of these were infections limited to the gut. The fourth was a good example of a salivary-gland infection. The glands were swarming with trypanosomes, and a portion of one of them injected under the skin of Rat 2,417 gave rise to infection.

TABLE VI.—WILD FLIES. RESULT OF THE DISSECTION OF THE INFECTED FLIES FOUND IN THE POSITIVE EXPERIMENTS.

Expt.	Time, days	Proboscis	Proventriculus	Fore-gut	Mid-gut	Hind-gut	Salivary glands
1,680	5	–	–	..	+	..	–
1,680	19	..	..	..	+	..	–
1,680	32	+	+ +	+ +	+ +	+ +	+ +
1,680	32	–	–	+	+	+	–
1,680	33	–	+ +	+ +	+ +	+ +	–
1,680	33	–	–	..	+	..	–
1,680	33	–	–	+ +	+ +	+ +	–
1,680	33	–	–	+	+	–	–
1,688	10	–	..	..	+	..	–
1,688	10	–	–	–	+	..	–
1,688	11	–	–	–	+	..	–
1,688	13	–	..	..	+	..	–
1,688	15	–	+ +	+ +	+ +	+ +	+ +
1,688	15	+	–	..	+	..	–
1,705	8	+	+	+	+	..	–
1,705	8	–	+	+	+	..	–
1,705	10	–	..	–	+	..	–
1,705	11	–	..	+	..	..	–
1,705	12	+	+	+	+	+	+ +
1,705	26	–	–	+ +	+ +	+ +	+ +
1,705	33	–	+	+ +	+ +	+ +	+ +
1,748	31	–	–	+ +	+ +	+ +	+ +
1,729	48	+	+	+	+	+	+ +

In Experiment 1,680 eight flies were found to be infected. In seven the flagellates were confined to the alimentary tract. The eighth had a well-marked invasion of the salivary glands. In this case trypanosomes were also seen in the proboscis, but whether in the labial cavity or the hypopharynx is not specified.

In Experiment 1,688 six flies were found to contain trypanosomes in the alimentary canal. In one of these there was also

infection of the salivary glands, which were crowded with trypanosomes. This fly must have been naturally infected when caught, as sufficient time had not elapsed since the infected feed to allow of time for development to take place. The flagellates contained in the salivary glands injected into Rat 1,721 gave rise to infection.

In Experiment 1,705 seven infected flies were found. Three of these had the salivary glands invaded. One of these, the fifth, must also have been a naturally infected wild fly.

In Experiment 1,748 only one infected fly was found. It had a copious infection of the salivary glands, a portion of which injected into Rat 1,852 gave a positive result.

In the last Experiment, 1,729, there was also only one infected fly found. The salivary glands were swarming with trypanosomes.

The next table gives the result of the dissection of the infected flies found in the experiments which remained negative.

In the negative Experiments 563, 1,560, and 1,710, none of the flies were found to be infected with trypanosomes in any part (*see* Table I). These experiments are therefore omitted from this table.

TABLE VII.—LABORATORY-BRED FLIES. RESULT OF THE DISSECTION OF THE INFECTED FLIES FOUND IN THE NEGATIVE EXPERIMENTS.

Expt.	Time, days	Proboscis	Proventriculus	Fore-gut	Mid-gut	Hind-gut	Proctodæum	Salivary glands
668	42	–	..	+	+	+	..	–
879	7	–	–	+	+	+	..	–
879	8	–	..	+	+ +	..	..	–
879	9	–	..	+	+	–	..	–
879	11	–	..	..	+	..	..	..
879	24	–	+	+	+	+	–	–
879	28	–	+ +	+ +	+ +	+ +	..	–
879	40	–	+ +	+ +	+ +	+	..	–
1,072	7	–	–	+	+	+	..	–
1,072	10	–	..	+	+	+	..	..
1,072	38	–	+ +	+ +	+ +	+ +	..	+ +
1,494	7	–	+ +	–	–	–	..	–
1,494	17	–	..	+	+	–	..	–
1,494	31	–	..	+	+	..	..	–
1,686	8	–	–	+ +	+ +	+	..	–
1,686	26	..	–	+	+	+	..	–

From these negative experiments it will be seen that only in one fly did an infection of salivary glands occur. Why this fly did not infect the animal it fed on is impossible to say.

The Methods used in the Examination of the Flies.

The flies were dissected as described in a previous paper.[1] As each fly in a cage died it was dissected, and the result, as regards the presence of trypanosomes in the alimentary tract and salivary glands, recorded. Fixed and stained preparations were then made from the various parts, and numerous drawings of the various types of trypanosomes encountered were made. The method described in a previous paper[2] of isolating infective flies and inducing them to salivate on clean cover-glasses was also made use of. This is a useful, simple, and practical method, as it demonstrates clearly the type of trypanosome thrown out from the tip of the proboscis when the fly feeds.

The Trypanosomes found in the Alimentary Tract.

In this species of trypanosome the developmental changes which take place in the intestine of *G. morsitans* are similar to those already described as occurring in the development of *T. gambiense* in *G. palpalis*.[3] The latter development has also been worked out very fully and completely by others.[4] It is therefore unnecessary here to do more than refer to these previous descriptions as being equally applicable to the species under consideration.

In this species of trypanosome also, as in *T. gambiense*, it is only a small percentage of the flies fed on an infected animal which become infected. In one series of *T. gambiense* this was 8 per cent.[5] In this species the experiments with laboratory-bred flies was 8·7 per cent, with wild flies 9 per cent. Just as in *T. gambiense*, the development takes place in the alimentary tract and salivary glands and not in the proboscis.

The Trypanosomes found in the Salivary Glands.

In the trypanosome causing disease in man in Nyasaland, as in *T. gambiense*, the crux of the whole matter is the invasion of the salivary glands. After a certain number of days—in this species from fourteen to thirty-one—the trypanosomes reach the salivary glands and the fly becomes infective.

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[1] *Proc. Roy. Soc.*, B, vol. lxxxiii, p. 513 (1911).
[2] *Ibid.*, B, vol. lxxxvii, p. 63 (1913).
[3] *Ibid.*, B, vol. lxxxiii, p. 515 (1911).
[4] Muriel Robertson, M.A., *Phil. Trans.*, B, vol. cciii (1913).
[5] *Proc. Roy. Soc.*, B, vol. lxxxiii, p. 514 (1911).

It is still a matter of speculation as to how they gain access to the glands, but, as described in a former paper,[1] there is no doubt they are often thrown forward into the proboscis during or just in the act of feeding, and may, under these conditions, be drawn into the hypopharynx and so reach their destination. These proventricular forms, however, have never been actually seen by the Commission in the hypopharynx.

Conclusions.

(1) The trypanosome causing disease in man in Nyasaland belongs to the same group as *T. gambiense*, the development taking place in the alimentary tract and salivary glands, not in the proboscis, of the fly.

(2) The percentage of flies which become *infected* is the same as in *T. gambiense*, eight per cent.

(3) The percentage of flies which become *infective* is about one per cent.

(4) The length of time which elapses before a fly becomes infective varies from fourteen to thirty-one days, average twenty-three days.

(5) The infective type of trypanosome in the salivary glands—corresponding to the final stage of the cycle of development—is similar to the short and stumpy form found in the blood of the vertebrate host.

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[1] *Proc. Roy. Soc.*, B, vol. lxxxvii, p. 65 (1913).

PHANTOM MATTER.

By Colonel R. H. FIRTH.

This article is not about ghosts; it is a somewhat ambitious attempt to explain in simple language the present position or meaning of the recently acquired facts concerning those interesting, but evanescent, forms of matter called the radio-elements. The evanescent character of these forms of matter is so marked that their chemistry has been described as a chemistry of phantoms. It will facilitate the better understanding of what is to follow, if one first reviews briefly the general nature of what is called radio-activity.

Radio-activity is a property of the atom, and that an element is radio-active is synonymous with its being in a condition of spontaneous change, and its chemistry is concerned with the nature of the products of those changes. At the present time, some thirty-six distinct types of radio-active matter are known, each having a characteristic kind of radio-activity, and each type entitled to be considered as a new atom and therefore a new chemical element. All these are derived from natural minerals containing either uranium or thorium, and are represented by such examples as radium, polonium and actinium from uranium, and meso-thorium and radio-thorium from thorium. Besides these, numerous other types of radio-active matter are known which are transitory, lasting in the various cases but months, days, hours, minutes or even seconds. Around these phantom elements the chief interest centres and, for their due comprehension, it must be understood that all radio-active elements give out radiations and some, like radium, thorium and actinium, give out in addition what are known as radio-active emanations or gases, which of themselves emit rays of similar kind to those from the other radio-elements. The radio-activity of the emanations is, however, transient, lasting a few days in the case of radium, a bare minute in the case of thorium, and a few seconds in the case of actinium. The gases or emanations can all be condensed out from the air at the temperature of liquid air. They resemble the argon group in that they are inert and impossible to make enter into chemical combination. They, moreover, have the power of imparting radio-activity to solid objects coming in contact with them. This induced activity is transient, decaying according to regular laws at characteristic rates; that from thorium

lasts a few days, while that from radium and actinium lasts but a few hours.

As the outcome of recent work, a complete concept of radio-activity is possible, so that we can say that the radio-elements are not only unstable, changing spontaneously, but that the change is accompanied by the expulsion from the original atom of rays and the production of a new type of radio-active atom. The latter is often much more unstable than the parent element, and changes again with the expulsion of rays and the formation of another new atom. As typical of what occurs, one may here give a brief summary of the main facts concerning thorium. Simple precipitation of the thorium from its solution by ammonium gives thorium hydroxide, from which the greater part of the radio-activity is found to have been removed. The solution from which the hydroxide has been precipitated possesses all the emanating power of the original solution and, on evaporation and ignition to expel ammonium salts, gives a minute residue containing the whole of the radio-activity of the original thorium. This newly separated radio-active substance is known as thorium *x*, but its activity is transient. In the course of a month it has disappeared completely, and in four days has decayed to half its initial value, the emanating power disappearing at the same rate. The hydroxide, at first but slightly radio-active, however, recovers its radio-activity and emanating power just as fast as that of the thorium *x* decays; in a month its activity regains its old value. If this be now dissolved and treated afresh with ammonium, a fresh amount of thorium *x* is precipitated of the same activity as the first. The thorium *x* is a short-lived radio-active product of the thorium, which itself produces the gaseous emanation, and the emanation in its turn produces the active deposit responsible for the production of the induced activity. The course of events is a sequence of atomic disintegrations.

Definite conclusions have been established as to the real nature of this atomic disintegration; although the rate of change varies enormously, still the change is the same in type and obeys the general law, "as time increases in arithmetic progression, the quantity of substance decreases in geometric progression," or the rate of change at every instant is proportional to the quantity remaining unchanged at that instant. So far as the individual atom is concerned, radio-activity is an instantaneous phenomenon, and an essential part of atomic disintegration is the expulsion from the substance of particles expelled radially in all directions with

great velocity. These expelled particles constitute the so-called rays, and three types of radiation are distinguished. They are, in order of penetrating power, the α, β, and γ radiation; the α rays, though feebly penetrative, are by far the most important type. The α rays, or rather the α particle of which they consist, carries two atomic charges of positive electricity, that is to say, it is a divalent ion, and the existence of this charge renders the particle liable to deviation by electric and magnetic forces. It has an atomic value of four in terms of hydrogen as unity, is identical with helium, and in all cases where the disintegration is marked by the expulsion of α rays, the atom suffers a loss of its mass, part of it being projected as a separate atom with a velocity of about one-tenth that of light. The β rays consist also of expelled particles, but they are not atoms of matter, but electrons or atoms of negative electricity. The γ rays generally accompany the β radiation, and are held to be particles consisting of an electrically neutral doublet of one negative electron and one, still unknown, positive mass or electron.

These three types of radiation are distinguishable mainly by their power of penetrating matter. The α rays are absorbed easily and have little power of penetration. All substances absorb α rays proportionally to the square root of the atomic weight of the substance, if elementary, or to the sum of the square roots of the weights of the constituent atoms, if a compound or mixture. In air, the range of the α particles varies between 2·6 and 8·6 cm., so that, knowing this range, the range in any other substance can be calculated. The β rays go through thin metal foils with ease, but are for the most part absorbed by a millimetre of lead. The γ rays are able to pass through a great thickness of metal without complete absorption; the more penetrating types are those of the thorium and radium series, and for these every 1·4 cm. of lead cuts down the radiation to about half its initial value. The three types of ray are distinguished also by their behaviour in a magnetic field; the α and β types are deviated while the γ are not. In the literature on this subject a reference may be found to the δ rays; they do not call for consideration in this article; it is probable that they are a secondary radiation set up by the impact of α rays on matter. Different fluorescent substances behave differently to the three types of ray. Zinc sulphide is the most sensitive for the α ray, while the platinocyanides and zinc silicate (willemite) are most sensitive for the β and γ rays. Magnesium platinocyanide, which responds brilliantly to the X-rays, is little affected by the β and γ rays.

The phenomenon of radio-activity being the manifestation of a spontaneous process of atomic transformation, the least amount of any type of radio-active matter that can be detected is the least amount in which this change can be detected; so that if the type changes rapidly, proportionately less of it will give determinable effects than if it changes slowly. Although the actual quantities of matter producing radio-active effects are usually infinitesimal, they are always capable of being calculated from the magnitude of the radiant effect and the period of average life of the radio-atom producing the effect. Obviously, the most important property of a radio-element is its period of life or its rate of change. This time constant identifies the particular element in all circumstances, and is determined by direct observation of the rate of decay of the radiation with time. Radio-activity decays in an exponential manner with time according to an equation into the mathematics of which one need not enter, and a constant, known as the radio-active constant, obtained; the physical meaning of this constant is the fraction of the total amount of radio-active substance disintegrating in the unit of time. The time required for one half the radio-active substance to change is known as the period of half-change. It can be shown mathematically that in a system changing according to the law of radio-active change, the period of average life of the atom is the figure obtained by dividing the radio-active constant into unity, and that figure is the future life of the atom, quite unaffected by the period the atom has already been in existence. Any time may be taken as the starting-point, and the period of average life is but the sum of the separate periods of future existence of all the individual atoms divided by the number in existence at the starting-point. Suppose we want to know the fraction of a mass of radium changing in a time so short that the total mass is not much diminished, say a few years. The period of average life of radium is known to be two thousand five hundred years, and the radio-active constant, or the amount changing per year is 1/2500, usually written 4×10^{-4}, and the fraction changing in any time, provided it is not too long, can be found from this by simple proportion. In this connection, it is worth remembering that in ten times the period of half-change of a radio-element, the quantity remaining is less than a tenth per cent, and in twenty times the period of half-change it is less than a millionth.

In minerals the various members of each disintegration series exist in quantities proportional to the period of average life, so that a radio-element with a period of life of less than a year must be

present in far smaller quantity than one which has a period some thousands of times longer. With those substances having periods of only hours or minutes, the actual quantities dealt with are infinitesimal and detectable only by their radio-activity. Obviously, a complete knowledge of a radio-element in the presence of any possible mixture of other elements is possible only for those radio-elements of periods of the order of a year or more. Radio-elements of shorter life than these cannot easily be separated from the original minerals, if only because during the progress of the necessary chemical operations they tend to change as fast as they are separated from their parent substance. They are invariably obtained by separating the parent in as pure a state as possible, in the radio-active sense, or free from other radio-active matter, and allowing it to accumulate its short-lived products. The separation operations are often relatively simple and rapid, and effected by adding a sensible quantity of an inactive substance which has a chemical resemblance to the radio-element required, which is only present in infinitesimal amount, and so using the former as a vehicle in the separation of the latter. Thus uranium $x1$ is prepared from a purified uranium salt which has been kept a few months since preparation, and has regenerated its full equilibrium quantity of uranium $x1$; thorium x is prepared similarly from pure thorium salts, which always contain radiothorium, the immediate parent, in considerable amount, and so on. Radiothorium cannot be separated chemically from thorium, but must be obtained from its parent mesothorium 2, which is separated from not too recent thorium. Similarly polonium can be obtained from the mineral, and also from an old preparation of radio-lead, in which polonium has been regenerated with the lapse of time. Radio-lead may be obtained from an old radium preparation which has been suitably preserved. The gaseous emanations in each series are readily removed from all non-volatile matter, and their subsequent products obtained pure in unweighable and invisible quantities, but of intense radio-activity. The emanation products or "active deposits" are often short-lived, and their separation in the pure state is possible by physical methods alone; those methods are in most cases of the greatest delicacy and highest technicality.

In a radio-active mineral in which the products of transformation accumulate and do not escape, the amount of each product formed is equal to the amount transformed per unit of time throughout the series; such is known as radio-active equilibrium. It follows that the relative amounts of the successive members of

the disintegration series in equilibrium are inversely proportional to their radio-active constants, or directly proportional to their periods of average life. Thus, in uranium minerals, there is a constant proportion between the quantities of the successive members. There is always about three million times as much uranium as radium, that is, some three tons of uranium per gramme of radium; so that if the period of average life of radium be 2,500 years, that of uranium is about 8,000 million years. In this way have been determined the periods of the very slowly changing elements and the amounts of the very short-lived products in the minerals. The period fixes not only the rate of decay of the radio-activity of a radio-element after it has been separated from its parent, but it fixes also the rate at which that radio-element is regenerated by its parent. Thus the β activity of uranium x, when separated from uranium, decays with a half-period of 24·6 days; in the uranium the β radiation is regenerated to the extent of one-half its normal equilibrium value in 24·6 days. In twice those periods, or 49·2 days, the β radiation of the uranium x will have decayed to one-fourth of its initial value, while that of the uranium parent will have increased to three-fourths of its final value. In this case we see that the quantity of uranium x and the β activity corresponding thereto increase with time until the equilibrium value is reached, and then do not change further. It is the period of the product, therefore, which fixes the rate of recovery as well as the rate of decay after equilibrium has been disturbed. A rapidly changing product is regenerated by its parent with corresponding rapidity, a slowly changing product with corresponding slowness.

If the period of the parent is very short, the radio-activity of the longer lived product may not be sufficiently great to be appreciable. Thus, an intense activity from radium *c*, which decays rapidly, produces a feeble but enduring activity due to radium *d*, the period of this latter being a quarter of a million times greater than that of its parent. So, again, the effect of the a activity of radium *a* deposited from radium emanation or niton on the walls of its containing vessel during a few minutes is equivalent to that given by the emanation itself; whereas the emanation of thorium has to be maintained in a continuous stream for many hours before an effect of the thorium active deposit at all comparable with that of the emanation is produced on the walls of the vessel. The reason of the disparity is, that in the first case the parent's period is two thousand times greater than that of the product; whereas in the second example the period of the product

is about seven hundred times that of the parent. These examples emphasize the fact that the quantity of radio-active substance divided by its period of average life fixes the number of atoms disintegrating per unit of time, and hence the degree of radio-activity.

The reader who has followed one so far may be still puzzled as to what has been called the "active deposit." Before going farther, it may be advisable to clear the point up. Owing to the existence of gaseous emanations in each series of radio-elements, which can be readily removed and condensed, they and their subsequent products can be obtained practically pure in unweighable and invisible quantities, but of intense radio-activity. The "active deposits" are the products of the emanations, and there are distinct active deposits or non-volatile products from the emanations of uranium, thorium and actinium, respectively. Having separated the emanations from the preparations which produce them, the collection of their active deposits is effected by charging a metal point or surface negatively with respect to the surface of the containing vessel. All these products of disintegration acquire instantly a positive charge, and the active deposit is formed entirely on the negatively charged electrode, which is then removed from the emanation and studied by itself. After solution or volatilization of the active deposit from the electrode, its ultimate products are obtained and examined; in most cases they amount to some six or eight elements; thus, from the active deposit of radium emanation or niton are produced successively radium *a*, *b*, *c*, *d*, *e*, *f*, and *g*. What is called radium *c* is now known to consist of two components c and c_2, having respective periods of 28·1 and 1·9 minutes.

We reach now a stage at which we can consider the disintegration series as they are now known and represented in the table which follows. The analogy between the three series is marked; that between actinium and thorium is very close, were it not that two products are known between thorium and radiothorium of which no representatives occur in the actinium series. The uranium series is distinguished by two products towards the end unrepresented in either of the other two. The table on next page shows the names, periods and some of the atomic weights of the known members of the three series of radio-elements.

It is noticeable that the atomic weights in most of the thorium and actinium series are still undetermined. Further, the parentage

of actinium is unknown, though there is much to suggest a derivation from uranium $x1$.

Uranium (8 × 10^9 years)	(238·5)	—	—	—	—
Uranium x 1 (35·5 days)	(230·5)	Thorium (4 × 10^9 years)	(232·5)	—	—
Uranium x 2 (1·6 minutes)	(230·5)	Mesothorium 1 (7·9 years)	?	—	—
Uranium II (period ?)	(230·5)	Mesothorium 2 (8·9 hours)	?	Actinium (period ?)	?
Ionium (5 × 10^6 years)	(230·5)	Radiothorium (2·91 years)	?	Radioactinium (28·1 days)	?
Radium (2,500 years)	(226·5)	Thorium x (5·35 days)	?	Actinium x (15 days)	?
Emanation (5·57 days)	(222·5)	Emanation (76 seconds)		Emanation (5·6 seconds)	?
Radium a (4·3 minutes)	(218·5)	Thorium a (0·2 second)	?	Actinium a (0·003 second)	?
Radium b (38·5 minutes)	(214·5)	Thorium b (15·3 hours)	?	Actinium b (52·1 minutes)	?
Radium c 1 (28·1 minutes)	(214·5)	Thorium c 1 (79 minutes)	?	Actinium c (3·1 minutes)	?
Radium c 2 (1·9 minutes)	(210·4)	Thorium c 2 (period ?)	?	—	—
Radium d (24 years ?)	(210·4)	Thorium d (4·5 minutes)	?	Actinium d (7·4 minutes)	?
Radium e (7·25 days)	(210·4)	Thorium e (period ?)	?	Actinium e (period ?)	?
Radium f or Polonium (202 days)	(210·4)	—	—	—	—
Radium g (probably lead)	(206·4)	—	—	—	—

An examination of this table, and the diagram which follows, presents certain points of interest. By them, we can trace the production of the elements from one another, also that in three separate series we can trace the successive transit of matter from group to group of the Periodic Table. The loss of an a particle or helium atom seems to cause the change of the element, not into the next family but into the next but one. Another curious thing is that in these series the families of odd valency are nowhere represented; thus, we have in each series a well-marked sequence from the tetravalents ionium and radiothorium, into the divalents radium, actinium x, and thorium x, and then on into the non-valent family of the emanations. Again, the product derived from polonium by the loss of an a particle is probably not bismuth but lead; in each case the step being from the family of even valency into the next, by missing that of odd valency. In some cases, the matter appears to alternate in its passage, passing through the same family not once but twice; thus, thorium of Group IVA,

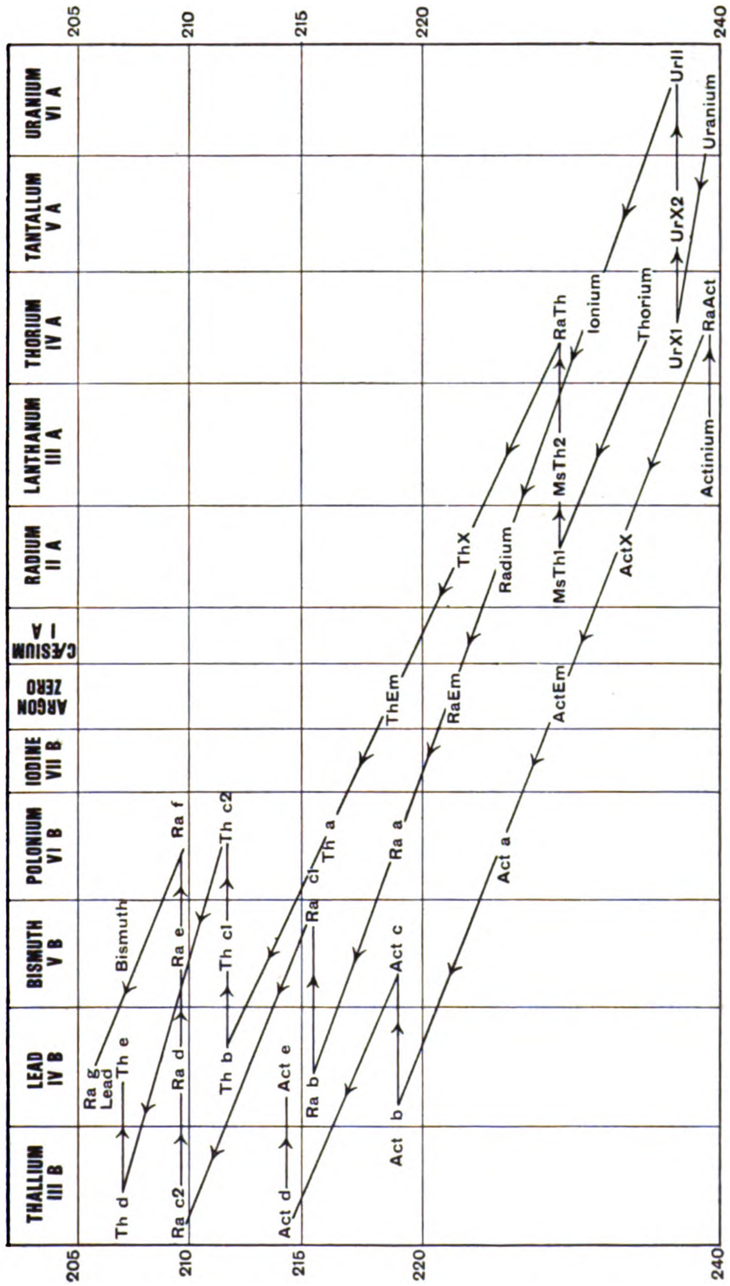
produces mesothorium of Group IIA, and the product of this is radiothorium of Group IVA, which in turn produces thorium x belonging to Group IIA. Again, radium d is chemically non-separable from lead of Group IVB, yet its product is polonium belonging to Group VIB, and the product of the latter is almost certainly lead of Group IVB. The helium produced by the earlier stages of the uranium disintegration, which in its ordinary form is non-valent like argon, carries by virtue of the radiant α particle two atomic charges of positive electricity, becoming therefore electro-chemically divalent. It is worth noting that radium passes direct from Group IIA to the zero group of the emanations, whereas the passage from the zero group back to the end of the last period occurs through the long chain of active deposit products. The active deposits represent, therefore, a new region in the constitution of matter, ephemeral and bridging the two ends of the purely Periodic Table. It would seem that the atom, having suffered successive reductions of its valency to zero, passes to the electro-negative end of the preceding valent period through a well-defined sequence of phantom forms.

It must be understood that the present attitude of physicists is to treat each radio-element as the chemical analogue of one or other of the known and non-radiant elements, from which it may not be separable though chemically identical. The conception of chemical non-separation being compatible with identity involves the acceptation of the fact that chemical analysis is really not an analysis of matter into homogeneous elements, but rather into a number of types, homogeneous merely in their chemical behaviour but not as regards other properties, such as atomic mass and stability. There is nothing against the acceptation of the fact; on the contrary the whole of the newer knowledge as to the radio-active elements impresses us with the fact that there are a number of types which prove to be not homogeneous. To express this complexity of matter and the newly revealed conditions, the term "isotope" has been suggested for chemically non-separable but identical elements occupying the same place in the Periodic Table; thus: Uranium x I, ionium, thorium, radiothorium and radioactinium are isotopes in Group IVA, while thorium d is isotopic in Group IIIB with radium c_2 and actinium d.

When the atom expels an α particle, it loses four units of mass and two atomic charges of positive electricity; on the other hand, in the expulsion of the β particle, the atom remains of practically unchanged mass, but loses a single atomic charge of negative

electricity or an electron, the mass of which may be considered negligible. The accompanying diagram, modified from one given by Soddy in a paper read in Section B of the British Association meeting at Birmingham, in August, 1913, shows the passage of the radio-elements in the three disintegration series through the Periodic Table. The ordinates represent units of atomic mass, and the abscissæ the number of successive places in the Periodic Table, which correspond, as has been found to be the case, to successive changes of the electrical content or load of the atom by one unit of charge. Owing to difficulties of space, and to make the diagram of reasonable size, neither the ordinates nor the abscissæ have been drawn to exact scale. In passing from right to left of the diagram, each spacing corresponds with an increase in the electrical content of the atom by one unit of negative electricity, or with a decrease of one unit of positive electricity. The top of the diagram shows the name of the element typical of each group or family, and also the number of the group. The zero group contains the inert gases, like argon and xenon, having no valency; a step to the right into Group IA, gives us an element, such as cassium or potassium, the ion of which carries a single positive charge, whilst a step to the left into Group VIIB, gives an element, like iodine or chlorine, whose ion carries a single negative charge. An α ray change is shown by left-pointing arrows bridging over from one space to the next but one and sloping up to represent the definite change in mass; the β ray change is shown by right-pointing arrows and bridging only one space. Owing to so little being known as to the atomic weight and origin of actinium, it is shown below the others, but it is probable that the atomic weights of actinium and radium and of their products, are more or less identical. The diagram makes clear the isotopism of the various radio-active elements, and emphasizes the value of radio-activity as an index of homogeneity.

Reference has been made previously to the generalization that the expulsion of the α particle caused the element to shift its position in the Periodic Table by two places in the direction of diminishing mass, and that the passage through the Table appeared to be alternating, the matter passing often through the same family not once, but twice. Later work shows that, in β ray expulsions, the element shifts its position by one place in the opposite direction to that for the α ray change, so that a succession of three changes, in any order of which two are accompanied by the expulsion of a β particle and one by an α particle, must result in the product coming back to the original place occupied by the


THALLIUM III B
LEAD IV B
BISMUTH V B
POLONIUM VI B
IODINE VII B
ARGON ZERO
CÆSIUM I A
RADIUM II A
LANTHANUM III A
THORIUM IV A
TANTALLUM V A
URANIUM VI A
205
210
215
220
240
Th d
Ra c2
Act d
Ra g Lead
Th e
Ra d
Th b
Act e
Ra b
Act b
Bismuth
Ra e
Th c1
Ra c1
Act c
Ra f
Th c2
Th a
Ra a
Act a
ThEm
RaEm
ActEm
ThX
Radium
ActX
MsTh1
MsTh2
Actinium
RaTh
Ionium
Thorium
UrX1
RaAct
UrX2
UrII
Uranium

parent. In consequence of these facts, we can now write the three disintegration series across the Periodic Table as in the diagram. It will be seen that every member of the series fits into its proper place in the Periodic Table, and all the elements occupying the same place are chemically non-separable and identical; this is independent of all considerations as to which disintegration series they belong, as to the atomic mass, the nature of the parent element, or the sequence of changes in which they result.

The reasons underlying these facts may be better understood by the following considerations. When an α particle is expelled it carries with it two charges of positive electricity, and the expulsion of these two positive charges from the atom affects the valency of the product, exactly as in ordinary chemo-electric changes of valency. If the atom were originally, for example, in the Group IVA, its ion is tetravalent and carries four atomic charges of positive electricity. Two such charges having been expelled with the α particle, the product falls into the divalent Group II A and non-separable from radium; but the mass is four units less. So with the β particle emission; the β particle is the negative electron, and the loss of this single atomic charge of negative electricity increases the positive valency of the product by one. Thus, we see radium *b*, isotopic with lead, expels a β particle and becomes radium *c*, isotopic with bismuth; but the mass is practically unchanged. When one α and two β particles are expelled successively in any order, the mass is reduced by four units, but the electrical content, as defined by the number of positive and negative charges in the atom, is unaltered; hence, the place occupied by the atom is the same as initially, and two atoms of different mass come to have identical chemical character, that is are isotopic. From these considerations, we realize that the place occupied by the atom in the Periodic Table is primarily not a function of its mass, as we have been accustomed to think, but of its electrical content, and only to a secondary extent of its mass. It follows that a chemical element is not necessarily homogeneous, and its atomic weight may be, and possibly is, a mean value rather than a natural constant. In the vertical rows of the diagram, on the other hand, where the mass varies by large differences as between the various members of the same elemental family, the members are analogous but not identical in chemical properties. From this point of view, the Periodic Table represents the chemical character of matter as the function of two, not one variable. Of these two variables, the electrical content is the essential in the

horizontal columns, and the mass in the vertical columns. Among the successive members of the horizontal rows, the mass, without direct influence on the chemical properties, is indirectly of great importance because of its effect on the stability of the atoms. If in a radio-active mineral only one isotope is stable, the substance must, in time, become homogeneous, unless, as in radio-active changes, the unstable isotope is being continuously maintained; but it may be that not only one isotope is stable, but more than one, and that considerations of this kind may explain why argon and tellurium are exceptions to the Periodic Law, and the absence of any mathematical connection between the atomic weights. Lastly, it appears likely that different elements occupying the same place in the Periodic Table will be indistinguishable in spectrum and many other physical properties. The spectra originate, probably, from the accelerations of only a very few electrons in their orbits in an outer ring around the atoms, that is, the same few electrons as govern chemical valency and affinity. These orbits are fixed by laws identical with those of Kepler for the length of the planetary year, in which electrical action, varying inversely with the square of the distance, takes the place of gravitational action. It is this electrical content, rather than the mass, which fixes the periods of these electrons and the wave-length of the spectrum lines. As the chemical character of a group of isotopes is not affected by variations of mass, it is reasonable to expect their electronic systems should be identical and, therefore, that all the elements occupying one place in the Periodic Table should give the same spectra. Thus, apart from questions of stability, which operate only in the case of the radio-elements, the only properties available for distinguishing between the individuals of a group of isotopes are those which depend directly upon the mass, and these are relatively few.

Intimately associated with the phantom forms of matter, under review, is the nature of their end products. Thus, the question arises whether common lead is a homogeneous element of 207·1 atomic weight, as commonly expressed, or a mixture of the end products of the three disintegration series in various proportions. There has long been an unexplained discrepancy between the atomic weight of lead and that calculated for the end product of the radium series. As the atomic weight of radium is now known to be 226, after the expulsion of five particles of mass 4 each, the atomic weight of the end product would be 206, or only 1·1 units below the value for lead. The theoretical value for the end

products of the thorium series is 232·4 minus 24 or 208·4. The end products of actinium may be neglected as they would be present in relatively small proportion. Hence it is clear that, whatever be the actual facts, the atomic weight of lead agrees with what might be expected for a mixture of the end products of the uranium and thorium series in similar proportion. The difficulty is, how to be sure that what appear as end products are really stable elements. We cannot be certain that some of these products may be changing too slowly to give a recognizable activity, and yet changing too rapidly to survive our time periods. Competent observers incline to the view that the bismuth and thallium found in radio-active minerals are the result of further changes of what have been regarded hitherto as the end products. These, for the thorium series, have a calculated atomic weight of 208, and can be assumed to pass by the loss of a β ray into bismuth (208), or of a β and an α ray into thallium (204). Undoubtedly, as a general rule, the α ray giving members of an isotopic group, having small atomic weights, are the least stable; whereas for the β ray giving members the reverse is the case. Applying the generalization, it is to be expected that if the end product of thorium, analogous to radium *d*, resembles it in expelling a β ray, it should be more stable than radium *d* (210), but less stable than radium *g* (206), because its atomic weight is about 208. If this be so, this product would not accumulate in minerals, but change slowly into bismuth, or into an element isotopic with it. As a matter of fact, though it is easy to get uranium from pitchblende, free from thorium, it is not easy to get thorium free from uranium; the inference is legitimate that possibly there is some genetic connection between the elements, of which we know nothing. Think of the facts as we may, it is clear that science is slowly solving the problem of the alchemists. If thallium could be made to expel an α particle or mercury to expel one α and one β particle, the product would be isotopic with gold. The attainment of such a transmutation is merely the application of sufficiently great electric potentials, probably of the order of some millions of volts. The crux of this effort lies in the attainment of insulating media to cope with such potentials.

It is impossible to close these notes upon phantom matter without referring to the structure of atoms, for it will be evident that all that is known as to the radio-elements must affect our conceptions regarding atomic structure. Of course, one does not write as an original worker in this field; the most one attempts

to do is to formulate one's ideas as they emerge from discursive reading. It is obvious that the electric charges on the α and β particles do come from the atom, and it is true that, in some α ray disintegrations, three rather than two charges of positive electricity appear to be liberated from a system previously electrically neutral, as one charge is found on the recoil atom. This may not be of much significance because an undetected α particle might account for the third charge. In any case, the shift of place of the atom in the periodical table is best explained on the view that the charges expelled with the rays are intrinsic to the atom. The further inference is legitimate that chemical and electro-chemical properties are controlled by the outer ring of electrons, while the radio-active changes are concerned with the atomic nucleus; this means that the expulsion of an α particle with its two positive charges alters only the electrical load of the nucleus. Similarly, since in certain uranium disintegrations, associated with the emission of β rays only, the products are isotopic and the parents are not, it must be inferred that the electrons lost in β ray changes come from a different area of atomic structure than those lost in chemo-electric changes; in other words, the β ray electrons like the α particles come from the nucleus. It is safe to say that chemical and chemo-electric changes of valency are concerned with electrons in the outermost ring, and are reversible by loss or gain of electrons from without. Radio-active changes, on the other hand, are concerned with changes in the inner nucleus, and such changes are not reversible by loss or gain of electrons from the ring. But, it is the electrical charge of the nucleus which controls, primarily, the ability of the outer ring to lose or acquire electrons from without, and controls, therefore, its chemical and physical properties.

As to the magnitude of the intra-atomic charge, some uncertainty prevails. Rutherford inclines to the view that the atom has an exceedingly small central nucleus, bearing a positive charge approximately one-half the atomic mass. Van der Broek has suggested that this positive charge, instead of being one-half of the atomic mass, may be the number corresponding with the place of the element in Mendelejeff's table, when the elements are arranged in sequence. Recent work lends some support to this latter view, more especially indicating that it is the nuclear charge, rather than the atomic mass which fixes the position of an element in the Periodic Table. The charge on the nucleus is overwhelmingly positive, and its variation, unit by unit, probably gives the successive places of the elements in the Periodic Table. Outside

this nucleus is the ring of negative electrons which alone are concerned in the chemical and most of the common physical properties of the element; the number of negative electrons is probably just sufficient to compensate the central positive charge, and may be as many as eight. Possibly, there is an inner ring or shell of electrons to account for the production of some of the newer phenomena exhibited by matter.

One closes this article with some misgivings as to how it will be appreciated by readers of our Journal. One realizes that it may be stiff reading to some; still, it covers ground which every doctor, claiming to be a scientific man, should know something about. One has tried to put a difficult subject into a readable form; to do so has meant the elimination of technical details and possibly much reduction of its value. Anyhow, one closes the notebooks from which the article has been put together, hoping that others may get as much pleasure in learning something about phantom matter and all it suggests as the writer has experienced in working the subject up, and summarizing what little he knows in these pages.

NOTES ON THE BACTERIOLOGY OF WOUNDS.

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The following investigations on the bacteriology of wounds were carried out on patients admitted to No. 12 General Hospital, established upon the Champs de Courses, Rouen.

All the patients investigated were brought down from Braisne on ambulance trains, and had received their wounds during the fighting on the Marne and the Aisne.

A.—Results of Aerobic Culture of the Pus from Wounds which showed no Evidence of Sloughing of Tissues.

Case	Nature of wound	Nature of infection	Remarks
1	Compound fracture of femur	*Staphylococcus albus* *Staphylococcus aureus*	Large exit wound. Secondary infection of *Bacillus pyocyaneus* on the fifth day.
2	Septic wound of arm ..	*Staphylococcus albus*	No general symptoms.
3	Compound fracture of radius	*Streptococcus pyogenes* *Staphylococcus albus*	Cellulitis of arm, with rise of temperature and pulse-rate.
4	Compound fracture of humerus	*Staphylococcus albus*	No constitutional symptoms. No local cellulitis.
5	Septic wound of arm ..	*Staphylococcus albus*	No general symptoms.
6	Compound fracture of metacarpal bone	*Bacillus coli communis*	Much purulent discharge.
7	Septic wound of leg	*Staphylococcus albus*	No general symptoms.
8	Septic wound of foot.. ..	*Streptococcus pyogenes* *Staphylococcus albus*	Constitutional symptoms and spreading inflammation.
9	Septic wound of arm ..	*Staphylococcus albus*	No spreading infective process.
10	Septic wound of buttock ..	*Staphylococcus aureus*	Ditto.
11	Compound fracture of tibia..	*Streptococcus pyogenes* *Bacillus coli communis*	Ditto.
12	Septic wound of buttock ..	*Bacillus coli communis*	Ditto.
13	Septic wound of thigh ..	*Staphylococcus aureus* *Bacillus coli communis*	Ditto.
14	Compound fracture of tibia..	*Bacillus coli communis* *Staphylococcus aureus*	Ditto.

This series consists of twenty-four cases of septic wounds which were examined bacteriologically.

The fact that several patients with extensive sloughing wounds were without general symptoms suggested that some organism of low virulence—possibly an anaerobe—was responsible for the condition of the wounds.

Parallel anaerobic and aerobic cultures were therefore made, with the following results:—

Case	Nature of wound	Nature of infection	
		Anaerobic culture	Aerobic culture
1	Wound of groin.. ..	Large Gram + bacillus..	*Staphylococcus albus.*
2	Wound of thigh.. ..	,, ,, ,, ..	*Bacillus coli communis.*
3	Wound of leg	,, ,, ,, ..	*Staphylococcus albus.* *Staphylococcus aureus.*
4	Wounds of back and of abdomen (extraperitoneal)	,, ,, ,, ..	*Staphylococcus albus.*
5	Wound of thigh ..	,, ,, ,, ..	*Bacillus coli communis.* *Staphylococcus aureus.*
6	Wound of thigh ..	,, ,, ,, ..	*Staphylococcus albus.*
7	Compound fracture of fibula	Large Gram + bacillus.. Short Gram – bacillus..	*Bacillus coli communis.* *Staphylococcus albus.*
8	Wounds of upper abdomen and thorax—traumatic empyema	Large Gram + bacillus..	*Bacillus coli communis.* *Staphylococcus albus.* Secondary infection by *Bacillus pyocyaneus* four days after admission.
9	Compound fracture of 2nd metacarpal bone	Large Gram + bacillus.. Short Gram – bacillus.. A few Gram + cocci	Short chained streptococcus. *Bacillus coli communis.*
10	Compound fracture of fibula	Large Gram + bacillus..	*Staphylococcus albus.*

Summary of Infective Organisms found in the Wounds in Order of Frequency.

Aerobic Cultures:—

Staphylococcus epidermidis albus	12 cases.
Bacillus coli communis	10 ,,
Staphylococcus pyogenes aureus	5 ,,
Streptococcus pyogenes	3 ,,
B. pyocyaneus (secondary infection)	2 ,,

Anaerobic Cultures:—

Large Gram-positive bacillus	10 ,,

Description of Anaerobic Bacillus found in the Wounds.

A large bacillus varying from 5 to 12 μ in length, and from 0·8 to 1·5 μ in breadth. It stains readily by Gram's method, and shows no evidence of spore formation.

Its morphological characters are remarkably constant in all the cultures made.

The bacillus grows very readily; in all cases a profuse growth being obtained after twenty-four hours incubation at 37° C. The colonies are large, rather opaque and discrete.

The anaerobic cultures were made in Buchner's tubes upon agar slopes; and that the bacilli grew truly anaerobically is proved by the fact that staphylococci were never found in the anaerobic cultures, while they grow profusely in aerobic cultures made at the same time and incubated simultaneously.

Description of Wounds.

The wounds in general are remarkable for the localization of the septic process, glandular infection or lymphangitis being absent altogether in the great majority of cases.

The wounds fall broadly into two classes:—

(*a*) Wounds, the result of shrapnel balls or rifle bullets, in which there is very little destruction of tissue, and from which there is only a small amount of seropurulent discharge. From these cases staphylococci and *Bacilli coli* were grown, but no anaerobic bacilli.

(*b*) Wounds, the result of fragments of large shells, or of the jagged fragments of the cases of shrapnel. In these cases there is much local destruction of tissues, and the wound is filled with grey sloughs. The discharge is profuse, and has a typical offensive odour which is present in all cases.

The chief feature in all the cases was the small amount of general disturbance accompanying the wounds.

Such severe cases as compound septic fractures, in which there was much shattering and comminution of the bone, and from the wounds of which there poured large quantities of offensive pus, were unaccompanied by any general symptoms. The temperature was normal, the pulse-rate not raised, and the general condition good.

This fact would seem to suggest that the infecting organism was one of low virulence in the majority of cases. In those cases in which sloughing occurred and from which an anaerobic bacillus was grown, it seemed possible that the infecting organism might be an earth organism which was present in the dirt on the skin of the patients.

An anaerobic culture was therefore made from the mud taken from the sole of the boot of a trooper from the trenches near

Braisne, who was wounded in the leg and brought down from the front on a stretcher.

This culture showed :—

(1) A large Gram-positive bacillus, similar to that grown from the wounds.

(2) A small Gram-negative bacillus.

(3) Some small Gram-positive cocci. (? Streptococci.)

The last two organisms may have been a contamination from horse dung, as they are facultative anaerobes in culture.

An anaerobic culture was also made from clean earth taken from the Champs de Courses, Rouen ; and in this culture the same large Gram-positive bacillus was found.

A bacillus morphologically identical with those grown from the wounds is therefore present in earth ; and that it is present in dirt on the skins of patients is shown by the following experiment.

Anaerobic cultures were made from the skin of the legs of three wounded soldiers who were brought down from the front. These men had not bathed for over six weeks, and the cultures were made before the men were washed in hospital.

In all three cases there was a profuse growth of a large Gram-positive bacillus identical with that grown from the wounds.

As a control experiment, anaerobic cultures were made from the skin of the legs of three officers, who had bathed regularly in cold water. The cultures were taken in the afternoon, with no preparation of the skin, which had been last cleaned at the morning bath. In none of these cases was there any growth anaerobically.

The following technique was employed in obtaining cultures from the skin. A few drops of peptone broth were placed on the skin and the skin underlying the drops was scraped gently with a sterile scalpel. Cultures were made from the broth drops in which the scrapings of the epidermis were suspended.

General Conclusions.

The source of infection of the wounds is the skin, aerobic cultures from which show the presence of *Staphylococcus epidermidis albus* or *Bacillus coli communis*, a common skin contamination when men are lying under insanitary conditions.

Anaerobic cultures from certain wounds contain a large Gram-positive bacillus which is found in earth ; the characteristic of these wounds being the offensive odour of their discharge, and the sloughing of the tissues immediately about the wound. That the

sloughing is due to the anaerobic bacillus is suggested by the rapid manner in which these wounds clear up with the use of hydrogen peroxide, extensive sloughs disappearing after three or four days' treatment.

On examining the cases of sloughing wounds it is remarkable that they all occur on the legs or abdomen, except in one or two cases of the palm of the hand. It was this fact which first suggested that the infecting organism might be an earth micro-organism which was present in the dirt on the man's skin; in which case the distribution of the wounds would accord with what might be expected, as the average British soldier washes his head, neck, arms, and chest on every available opportunity; whereas the skin of the abdomen and legs may be unwashed for long periods of time.

This short series of cases seems to show that the infection of the wounds is in the main one of low virulence, the damage to the tissues being chiefly effected by the concussion of the shell or bullet as the case may be, and not by the infecting micro-organism.

INCINERATION AND INCINERATORS AS APPLIED TO CANTONMENTS IN INDIA.

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Incineration may be defined as the destruction by fire of waste products in such a manner as to prevent injury to the health of human beings and with as little offence as possible.

To fulfil these conditions, the waste materials must, after becoming waste, be burnt within the shortest possible time and with the least handling and transportation. The incinerator must therefore be as close as possible to the place where the materials become "waste."

The materials requiring incineration are organic and highly putrescible, and are either the result of processes necessary to sustain human or animal life or of the manufacture of articles intended for the same purpose.

The principal materials coming under the first category are the resultants of the ingestion of food into the body, i.e., fæces, urine, litter, etc.; while under the second are refuse from food preparation, waste food materials and manufacturing refuse.

In military life, in India, the materials coming under the first category most usually require to be dealt with, those under the second being only encountered as "bazaar refuse." All such materials are liable to contain bacteria which, if they gain access to the human body, may produce disease, and their complete destruction is therefore essential.

In India, two systems are in use for the disposal of such material, i.e., incineration and trenching. Each has, under certain circumstances, advantages or disadvantages which decide the system to be used, and these may be set out as follows:—

Incineration.	*Trenching.*
Most of the carts are unnecessary.	All material must be carted to a distance.
Waste materials burnt as soon as passed.	Crowley carts have to travel through cantonments. They smell and are apt to spill contents.
Works well in the rains.	Trenching difficult in the rains.
All flies' eggs burnt.	Flies will breed if trenching is not done properly.

Incineration.	*Trenching.*
A bad or small pattern incinerator is liable to be offensive.	Carts are offensive.
No monetary return.	Monetary return from rent of trenched land.
Necessary litter must be available.	Not applicable.

Where fuel is available incineration is probably the best method and, even where no cavalry or horsed units are stationed, it is the practice, if sheds exist, to collect leaves, etc., in the dry weather and to incinerate in the rains. The extent to which incineration can be employed in a cantonment therefore depends on the amount of litter or leaves available as fuel. Bazaar and bungalow refuse, containing as it does large quantities of inorganic matter, such as stones, bones, tins, etc., is unsuited for burning in the ordinary incinerators, since the fire bars become rapidly clogged. It must therefore be dealt with by separate arrangements, specially designed.

In Jubbulpore, refuse from the slaughter-house is burnt. It would seem hardly credible that entrails, etc., could be disposed of in this manner without the use of coal or wood, but it is done with litter only. This is a great safeguard since, however carefully the material is buried, it is liable to be dug up by jackals, etc.

Incinerators.—The ideal incinerator is still in process of evolution and, under varying circumstances, slight changes in type are necessary. Most cantonments record the progress in design by the various patterns still in existence, the older types as they become unserviceable being replaced by newer.

To carry out the principles laid down in the definition the ideal incinerator must fulfil the following conditions :—

(*a*) It must be capable of burning continuously and completely destroy organic material, in such a manner as to prevent the escape of anything from it deleterious to health.

(*b*) It must work with a minimum of smoke and smell.

(*c*) It must be sufficiently simple in action as to enable it to be worked by natives of low intelligence.

The substances which constitute a danger to health are bacteria, etc. Presupposing that waste materials are placed in the incinerator in a cleanly manner, and that they are not allowed to drop through the bars, the only way in which bacteria could escape would be in the ashes or smoke. As both of these in a properly conducted incinerator have been proved to be sterile, a well conducted and well designed incinerator may be said to render innocuous any material for which it is suitable. A certain amount of smoke and smell is

unavoidable; but it is possible by attention to the design and to the management of the incinerator to lessen the character of the offence and to discharge the smoke in such a way as to ensure its dilution and dispersion.

Incinerator Design.—The following points must be considered when designing an incinerator. It must:—

(*a*) Be simple in construction and not above the intelligence of the sweeper.

(*b*) Be constructed of materials which will resist heat and yet not make the expense too great.

(*c*) Be capable of rapidly and completely disposing of the materials for which it is intended.

(*d*) Be economical in fuel.

(*e*) Be easily loaded and cleaned.

(*a*) The intelligence of the sweeper class is small, and they are very conservative. They have an idea that if they are asked to use an implement which they do not understand or disapprove of, they have only to break or block it in order to show the sahib that it is impracticable. Anything which gives a little trouble also is sure to be broken, in the hope that it will not be renewed. The sweeper also is difficult to obtain, owing to the small wages given and to the number of other occupations opening up for him, so it is not possible to put on too much pressure or the individuals run away. There is, however, no need for a complicated apparatus as the simplest works quite well.

(*b*) The materials available for the construction of an incinerator are brick, stone, iron, reinforced concrete and crude brick. Stone splinters with heat and is also only obtainable in a few places. It is excellent for flooring and foundations, when pointed with cement, and the loading door sill can with advantage be made of it. Iron is not found satisfactory, since it soon rusts or is eaten through. It is also expensive and loses heat rapidly. Reinforced concrete has not been tried on account of the expense, but would probably be the most durable material. Brick is cheap and, in a properly designed incinerator, lasts well. Crude brick can only be used for temporary arrangements in camp.

(*c*) The complete disposal of material is a question of design and is dealt with further on.

(*d*) Since fuel must cost nothing, and since only a certain amount is available the greatest economy has to be exercised.

(*e*) Easy loading and cleaning is essential, but some of the overhead-loading patterns are not easily cleaned. Strength and durability are the first essentials, and must not be sacrificed.

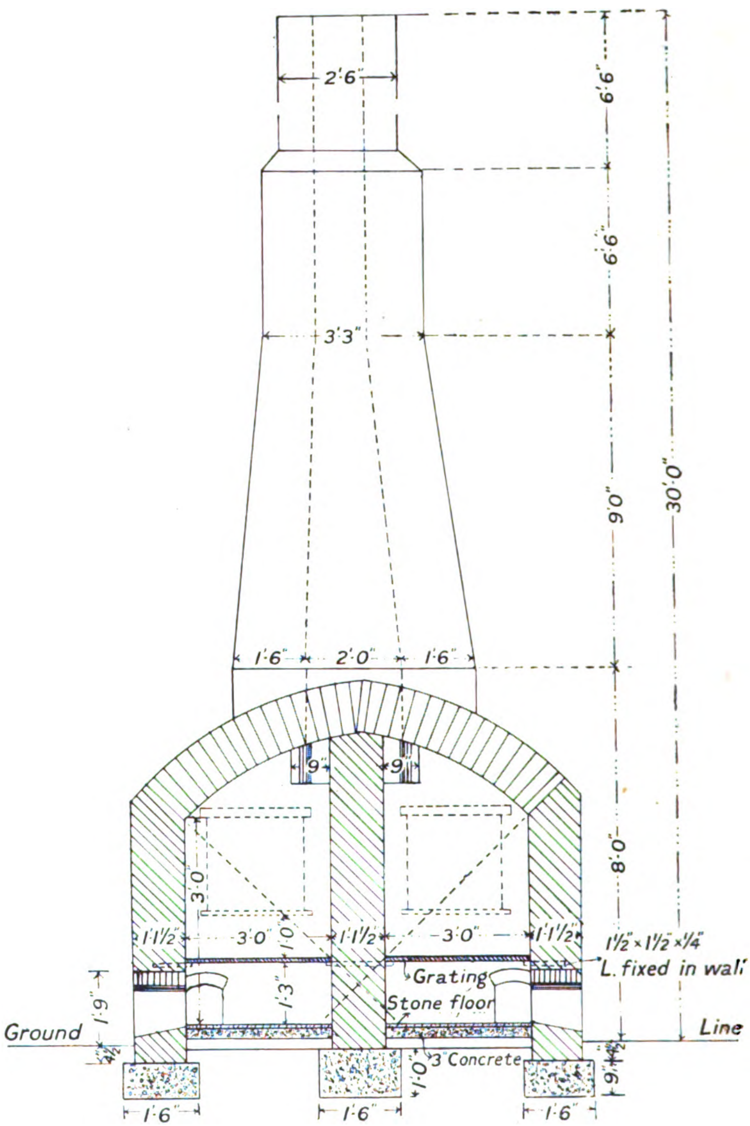
When endeavouring to design an incinerator it is advisable to obtain the advice of the Royal Engineers. Many of the patterns at first devised would have been much improved if this had been done. The first point which limits the design is that latrines must not be too far from barracks and bungalows, or ditches, etc., will be used instead. The latrine and incinerator must therefore be sited within a comparatively short distance and, in the case of bungalows, actually in the centre of the group they are intended to serve. As it is impossible to avoid a certain amount of smoke and smell, chiefly that of burning litter, some method must be adopted to avoid its being blown into the bungalows. During the hot weather and the rains there is usually wind to disperse the smoke which, not being so rapidly cooled, rises higher. In the cold weather the smoke is rapidly chilled, and, as the nights are usually still, it settles down over the surrounding ground. The first desideratum, therefore, is that the smoke and fumes be thrown as high in the air as possible, in the hope that they will diffuse and fall to the ground far from human habitations. Consistent with draught the chimney should therefore be of maximum height. This involves a large amount of weight, so that proper foundations are required. In most of the old pattern incinerators the chimney was placed on the top of the incinerator, an admirable idea from the point of view of the draught but mechanically impossible if a chimney of great weight is required. The chimney should, therefore, be built up from the ground, the size of the foundations being dependent on the character of the soil.

The weights per square foot which can be safely used on foundations are :—

Loamy soil, black cotton, laterite, etc.	0·8 ton per sq. ft.
In stiff clays	1 to 1·5 ,, ,, ,,
In rock	1·5 to 3·5 ,, ,, ,,
On concrete	Up to 3·6 ,, ,, ,,

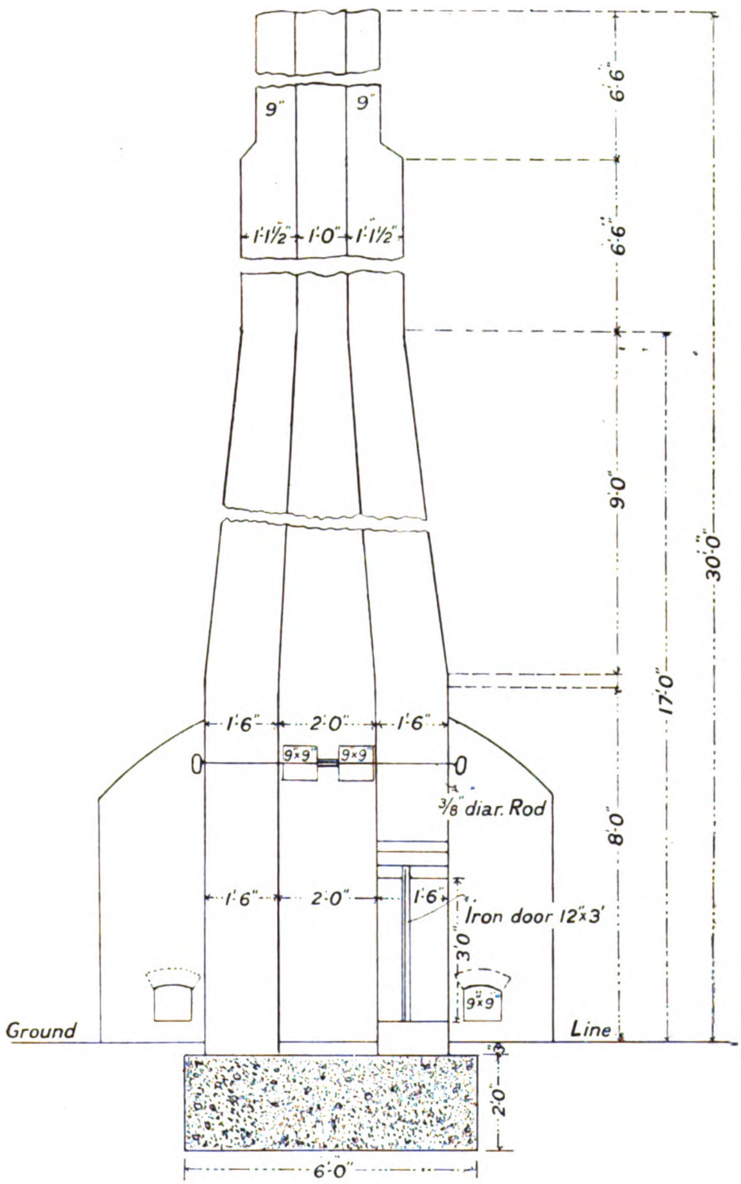
—("Military Works Handbook," p. 97.)

The chimney should be of brick with a flue sectional area proportionate to the amount of burnt gas which will be required to pass through it. It may be round or square, the latter for preference from the point of view of cheapness of construction. Too large an internal area spoils the draught by allowing expansion of the gases, while too small an area chokes it. Since the gases cool and contract as they ascend, the sectional area of the flue may be slightly smaller at the top than at the bottom (see pp. 604-5). The internal surface must, of course, be perfectly smooth, as



SECTION ON A.B.

Scale ½" = 2'.



SECTION OF CHIMNEY.

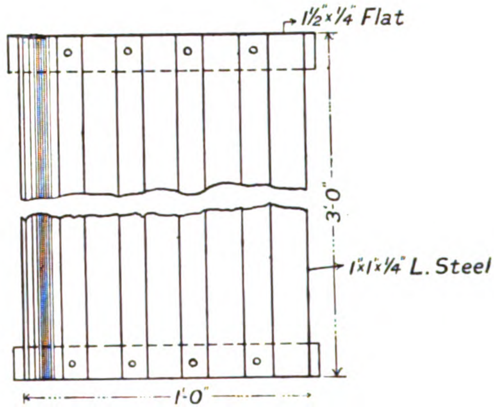
Scale ½" = 2'.

projections hinder the draught and collect soot. Iron chimneys are inadvisable as they corrode rapidly, and since the metal rapidly conducts away heat, the column of gas is cooled too quickly. A brick chimney retains the heat and thus tends to promote draught

Sixteen Gratings of this Size are Required.

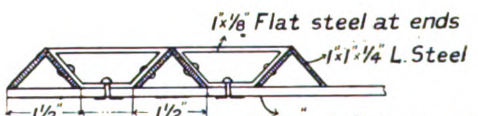
Plan of Grating.

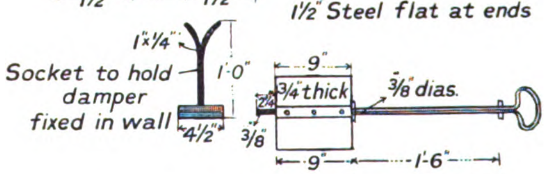
Scale $1\frac{1}{2}'' = 1'$.



Enlarged Section of Grating.

Scale quarter size.





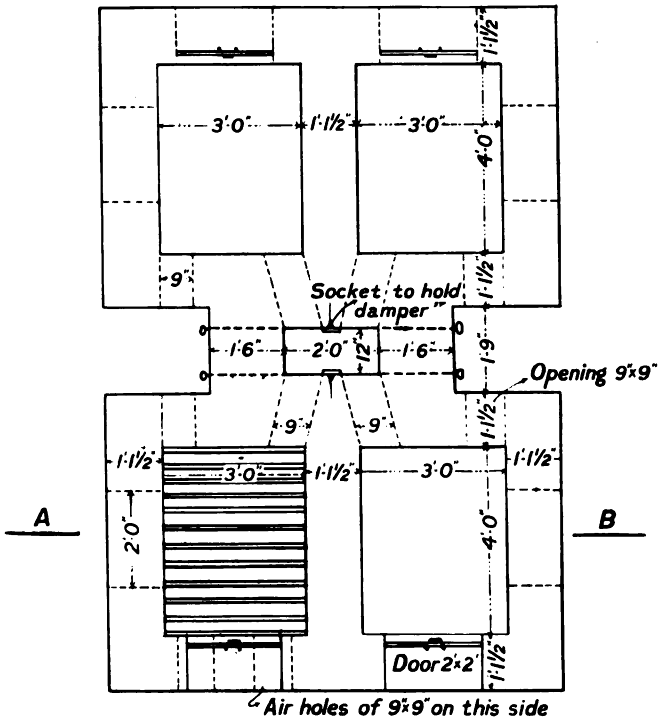
Detail of Damper.

Scale $\frac{1}{2}'' = 1'$.

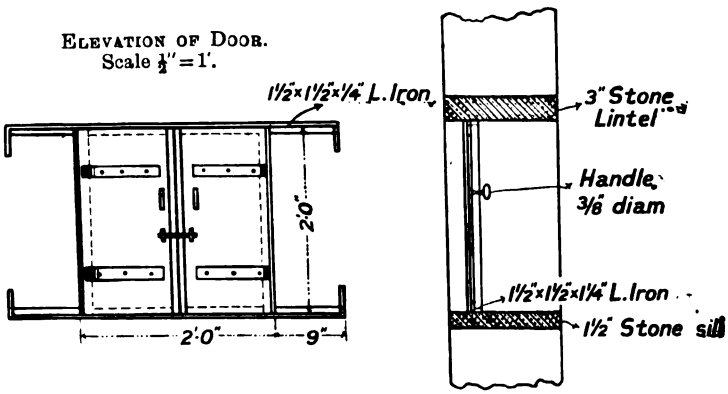
when the external air cools at night. Once the gases are cooled to the temperature of the outside air they will no longer ascend, but have to be pushed up by the warmer air below and the incinerator then tends to smoke from the air inlets below.

PLAN OF INCINERATOR.

Scale ½″ = 2′.



ELEVATION OF DOOR.
Scale ½″ = 1′.



A fierce draught is not desirable as very slow combustion is necessary for successful working, and some device, such as a butterfly valve, should be introduced to check it; the moist material to be burnt should be so added as to permit only slow combustion (see Management). In this way a minimum of smoke and smell is obtained.

The sectional area of the flue can only be determined by experiment, but for the incinerator shown in the plan an area of two square feet below and one square foot above has been found to work very well.

When a large chimney is required provision should be made for cleaning, as tarry matters collect very rapidly. This, as in the plan, can be effected by inserting at the base a narrow iron door, sufficiently large to admit a sweeper. A cap is not necessary for the top of the chimney since rain cannot reach the fire, and a cap would act as a baffle to the ascending smoke. When rain-caps are in use they should be made so that they can be removed in the dry weather.

For a small or single-celled incinerator a length of drain pipe forms a suitable upper section to the chimney, being light and smooth inside. More than one length is apt to be blown down by storms.

The combustion chamber is conveniently made rectangular in shape, as brick lends itself to this form, and square grates are easily made. The floor should be concrete or stone, as otherwise in raking out the ash a hollow is apt to be formed below the grate, which becomes full of water in the rains. The floor should also be continuous with the foundations. The internal dimensions, horizontally, should not exceed four feet by four feet, as larger sizes are difficult to stoke.

The walls, as shown in the diagram, should be eight feet high, and a ledge of brick must be left one and a quarter feet from the ground to take the grates.

Three or four openings must be left in the walls, below the grates, to admit air, and also to enable ash to be raked out.

The shape of the combustion chamber is of importance owing the effect on the draught. The air passes through the grates and the mass of combustible material vertically or with a slight inclination towards the chimney. After passing the fuel it should be directed towards the chimney opening, and hence the roof of the chamber should be sloped as in the drawing. There should also be a slope from the sides, the old pattern incinerator shown in

fig. 1 with a chimney on the top being the ideal arrangement as far as draught goes. This pattern, however, cannot be fitted with a large chimney, as the weight tends to thrust the walls of the incinerator apart. The inclusion of a loading door in the roof also weakens the chimney support. Difficulties in construction

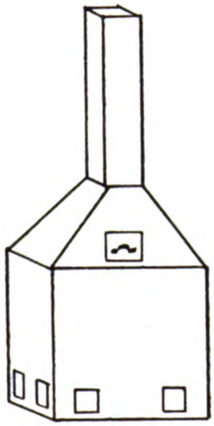


FIG. 1.

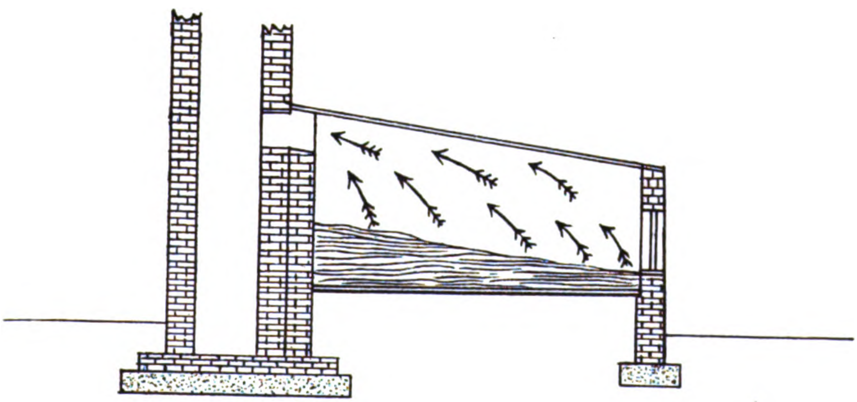


FIG. 2.

render the ideal roof (fig. 2) in brick impossible, so that the roofs of large incinerators are made horizontal. This provides a dead space near the door where whirls of smoke form and, as is well known, a whirl of gas acts like a solid body and tends to check the draught (fig. 3). When, however, four cells are built round a chimney it is possible to limit the dead space, laterally, by combining two cells under one arch (fig. 4). This makes for economy in construction,

provides a support for the roof and, as there are two walls less than would be required in two cells built separately, saves heat for draught producing purposes.

If two similar cells are added to the other side of the chimney an incinerator is arrived at with as few mechanical disadvantages

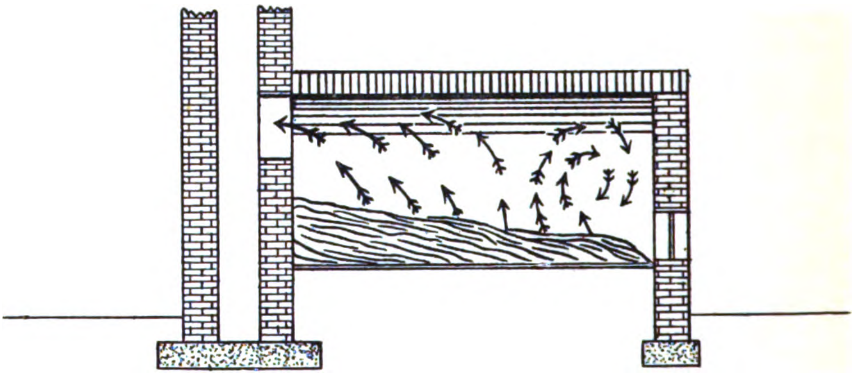


FIG. 3.

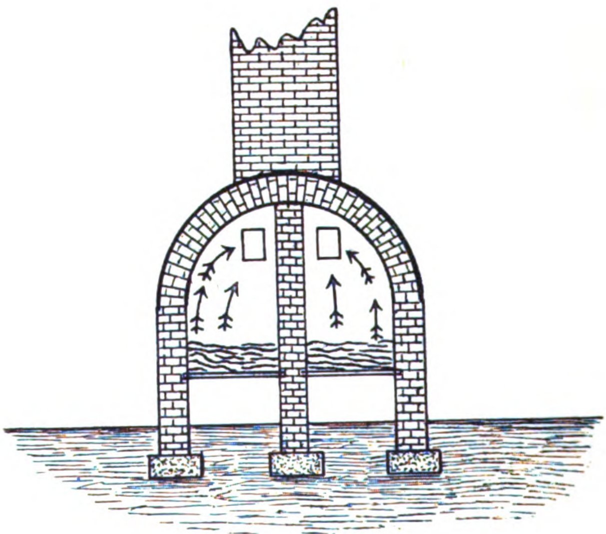


FIG. 4.

as possible, consistent with rigidity and economy. Such an incinerator, with four cells of four feet by four feet internal dimensions each, has been found efficient for one thousand men, to be extremely economical in fuel and to emit little smoke. Details

of such an incinerator are shown on p. 607. The doors are of iron in an iron frame, anchored in the brickwork, the door sill being of stone to take the blows from the pails when they are emptied. Loading from above would be better, but the height is too great and the sweeper invariably shuts the doors with a bang in the overhead-loading pattern, very soon jarring the door frame loose from the bricks. It is also difficult to use the rake, from the top, or the slice for cleaning the fire bars. With the doors vertical there is no reason for their being shut with a bang. The grates should be in sections, of dimensions which will allow of their being passed through the door in case one burns out, though this is of rare occurrence owing to the slowness of combustion. The bars may be round, square or "V" shaped, but care must be taken not to have too long a bar unsupported, as when hot it is liable to bend with the weight of the fuel. It is found, in practice, that the following types of incinerator are required in cantonment:—

Types of Incinerators.—(*a*) The large four-celled type, with high chimney, for the grouped latrines of a battalion or for similar latrines in the bazaar.

(*b*) The single-celled type, with moderately high chimney, for a latrine serving the native servants in a group of bungalows.

(*c*) The large incinerator for bazaar and other refuse. The large four-celled incinerator type, being practically smokeless and odourless, and delivering the products of combustion at a good height above the ground, is far preferable to the old pattern small incinerator.

(*a*) In the native infantry lines, in Mhow, one of these has replaced twelve of the pattern with the central chimney, shown in fig. 1. These incinerators, by the smoke and smell they emitted, made life a burden for the neighbouring bungalow occupants, but no complaints have been received since the substitution of the larger type. It can, and should, be constructed of the best materials, and its cost is approximately Rs. 300 or £20. If properly constructed it should not require repairs for a considerable period, but it must not be brought into use for a month, after construction, to allow the work to set.

(*b*) The smaller type is occasionally offensive, but this cannot at present be prevented, since losing heat as it does from all walls, and having a small fire body, the chimney cannot be raised to a satisfactory height. These incinerators have to be placed in the middle of groups of bungalows, and hence fumes must occasionally reach those to leeward. Devices for washing or reburning the smoke only check the draught and make smoke come out of the

air holes at the bottom. Fierce combustion would increase the draught, and these incinerators might then be used with success, but this would necessitate the use of coal or some such fuel, at a prohibitive cost. They are, at any rate, not so offensive as the carts necessary for trenching operations.

(*c*) Refuse destructors, owing to the incombustible nature of the fuel and to the clinker which forms, are difficult to deal with. In Jubbulpore they work fairly successfully, but in most cantonments the refuse is buried or used to fill holes in the ground, a good covering of earth being then added. Since such refuse does not, as a rule, contain fæcal matter it is unlikely to become a focus of disease, and flies can be prevented from breeding by a proper covering of earth. In some cantonments the refuse is used for brick burning, but this has to be carefully watched, to prevent accumulations and nuisance.

Attempts have been made to get rid of waste materials in a large central incinerator and there is, at present, a derelict one in Mhow. This involves the nuisance and expense of cartage and has no advantage over the trenching system.

Management.—It must be remembered that, when dealing with fæcal matter, we have a material containing a large quantity of water. It is, therefore, not possible to treat it as a solid for the purpose of incineration. In preparing an incinerator, before lighting, it is usual to cover the grate with a thick mattress of litter, as dry as possible, and about a foot thick. Less than this would allow the material to fall through when the latrine buckets are emptied. When commencing work the incinerator is lit from below and, when well alight, i.e., smoke rising slightly from all over the fuel, the contents of the latrine buckets are emptied in so as to form a thin layer all over the mattress. More litter is then added, to form a layer, and more fæcal material till the material is exhausted or the incinerator is full. Care must be taken that the whole of the grate is covered or air will be drawn through the uncovered part and not through the fuel. The incinerator can then be left, one sweeper keeping his eye on it to damp down with urine or washing water if too much smoke is produced. The merest thread of smoke should be visible if the apparatus is working properly. When thus filled it should burn for about eight hours without attention. Whether this practice is adopted, or whether the sweeper adds all material, as it is passed, depends on the character of the latrine. With a regiment most of the material is available in the morning and evening. A regimental incinerator, therefore, should be loaded at 7 a.m., 3 p.m., and again at 7 to 8 p.m., so as

to keep the fire in all night. If possible, an incinerator should not be allowed to go out, as starting induces considerable smoke and smell. In a bazaar incinerator the attendance on the latrine is constant all day so that the pail contents may be fed in at once. Litter is often placed in the pails for the fæces and this mixes fuel and excreta to a certain extent and also tends to keep the pails cleaner. Ashes are removed, by raking, whenever necessary. If a damper is provided, this should be used at night to limit combustion and keep the fire alight.

The smaller incinerators require a great amount of care (which they usually do not receive) to prevent them becoming a nuisance. If managed as above, the pail contents and some litter being added at once, practically no offence occurs, but it is found, in practice, that the sweeper collects all the material, produced in the bungalow during the day, in a large iron receptacle and carries it to the incinerator as soon as it becomes dark. Since this is done for all bungalows around, the incinerator becomes overloaded and, about dinner time, the smell is disgusting, till the fire has got hold. It seems impossible to induce the sweepers to carry material to the incinerator during the day, and, as has been said before, they are difficult people to put pressure on. An incinerator to each bungalow would fail for want of fuel and would be a source of danger, as a number of small units cannot be so well supervised as a few large ones.

As regards the question of storing the litter, this should be placed in a covered shed, with concrete floors. The shed should be divided into two, by a wall, and the containing walls should be sufficiently high to keep rain out and to prevent litter being blown about by the wind. One day's supply of litter should be kept in each compartment and each should be thoroughly emptied before being refilled. In this way it is impossible for flies to breed, since their eggs are burnt daily, and they cannot penetrate the concrete floors. Wire screening, against flies, is therefore useless and unnecessary.

A sweeper's house should be built near the latrine as, if the sweeper has any excuse to go away, he will neglect his duties.

Urine.—As regards urine and washing water it may be said at once that, except for the small amount used for "damping down," it is impossible to get rid of it by incineration. It may be disposed of in covered pits, near the incinerator, if the soil is suitable, otherwise it must be removed and trenched.

Incineration in Camp and on the Line of March.—Whether or no incineration can be carried out successfully under active service

or manœuvre conditions depends on the length of time troops are stationary in camp. Numerous forms of incinerators have been devised, to be carried with the troops, but these, from the nature of things, must be unsatisfactory. When a battalion goes into camp for the night the incinerator must be started, material being stored round it till it can be disposed of, since to be portable the capacity of the incinerator cannot be great. It must be kept burning all night, under the supervision of a sweeper who has marched all day, and, when the troops march off in the morning, it must accompany them, so that all material left in the incinerator or pails, has to be buried. The pails and incinerator are bound to be dirty and also add to the regimental transport. Since much of the material has to be buried, the shallow trench system is surely preferable, involving as it does no extra expense or transport.

In a standing camp one of the incinerators shown in the "Manual of Military Hygiene," built of crude brick or turf, will work successfully, provided sufficient fuel is available, and would be far more efficient than any portable pattern. Personally, I am very much against portable incinerators, except, perhaps, for camps where the ground is so rocky as to preclude trench digging. Even where the subsoil water is high there is usually sufficient dry soil to allow shallow trenches to be dug.

Conclusion.—The above remarks sum up the position as regards incineration, in India. Not only is incineration possible, but, if properly carried out, waste materials can be got rid of effectually, without danger to health or offence, and at little expense. It is therefore, where fuel is available, preferable to trenching, since the latter, if carelessly done, encourages the breeding of flies. At home very little is known about incineration, either as regards the principles or the limitations, whilst in India, although most officers are familiar with the look of the outsides of the various incinerators about cantonments, and occasionally with the smell, they know little about the practical details. These are left to the cantonment authorities and the sweeper. The object of this paper is to enable anyone to familiarize himself with the principles and working of such apparatus. It is also probable that incinerators might be used with advantage in garrisons in other countries, where removal by the water carriage system is found impracticable. Simplicity is the key-note of the whole system, no complicated apparatus being required and no especial skill in the working. What can be done successfully by a cantonment sweeper should be within the intellectual capacity of men of other races.

STATISTIQUES SANITAIRES; LEUR IMPORTANCE POUR L'ÉTUDE DES CONDITIONS PHYSIQUES ET MORALES DES TROUPES.

By Dr. MORAES MANCHEGO.

Médecin de l'Armée portugaise.

Pour pouvoir se faire une idée sur la valeur d'une armée, il ne suffit pas de connaître exactement son organisation, le nombre de soldats et le matériel dont elle dispose; d'autres données sont encore nécessaires, parmi lesquels on doit réserver une place importante à ceux qui résultent de l'étude des conditions sanitaires des troupes. Ces études ont été poursuivies au Portugal au moyen de statistiques qui ne sont pas si complètes que celles des principales armées, mais qui fournissent toutefois toutes les indications principales pour les recherches comparatives internationales. La statistique de 1911 est organisée et sous presse; on y peut voir que l'armée portugaise n'occupe pas une des meilleures places sous ce point de vue, mais qu'elle n'est pas non plus la plus mal placée parmi celles qui publient ces données officielles. Dans l'armée portugaise on compte 874·9 de malades pour 1,000 hommes de l'effectif moyen, tandis que l'Autriche compte 830·9, l'Italie (1906) 728, la France 726, l'Allemagne 591, la Russie (1908) 441·6, l'Angleterre 346·3, l'Espagne 894·6, les Etats-Unis 935·74.

Si on prend la fièvre typhoïde (enteric fever) comme type pour l'étude de l'état sanitaire des troupes, on obtient les chiffres suivants qui ont trait à 1911: Angleterre 0·6, Etats-Unis 0·78, Autriche 2, Portugal 2·41, Espagne 3·63, France 3·7.

La presse espagnole publie un grand nombre d'articles germanophiles plus ou moins phantaisistes; on a même organisé des études qui ont pour base des données absolument fausses. Le journal *Heraldo de Madrid* a publié un travail sur l'organisation sanitaire des armées qui combattent dans lequel l'auteur a attribué à la France le chiffre 3·74 comme mortalité militaire de 1911 (pour 1,000 hommes de l'effectif moyen) au lieu de 2·99, à l'Allemagne 1·08 au lieu de 1·9, au Portugal 2·36 au lieu de 3·69, pour en tirer des conclusions tout-à-fait défavorables aux armées alliées (cet article a paru au mois de septembre dernier).

Ces études comparatifs, s'ils ont pour point de départ des données exactes, méritent sans doute une certaine importance; ils permettent d'arriver à quelques conclusions probables en ce qui

concerne les conditions physiques des troupes, mais sont-ils significatifs au point de vue des conditions morales ?

Tout d'abord, il est très naturel de supposer que la dépression morale n'est pas sans influence sur le degré de morbidité dans une armée ; c'est un agent à mettre à côté de beaucoup d'autres qui déterminent les chiffres statistiques. Plus significatives sont peut-être les données suivantes : Dans la même année (1911) le nombre de morts par suicide pour 1,000 hommes (soldats, caporaux, sous-officiers) de l'effectif moyen de l'armée a été au Portugal 0·03, en Espagne 0·048, en France 0·19, en Russie (1908) 0·19, en Italie (1906) 0·23, en Allemagne 0·43, en Autriche 0·67. Dans le chiffre qui a trait à l'Allemagne on ne compte pas un nombre élevé de tentatives de suicide. Voilà un groupe de données exactes qui jette quelque lumière sur un aspect des conditions morales des troupes et qui ne s'accorde pas très bien avec les arguments des germanophiles qui font l'éloge du militarisme allemand. Si celui-ci a, comme ils le déclarent, " tous les caractères d'une démocratie," s'il n'existe pas " dans le sens d'un agent oppresseur de la volonté civile " (ce sont les expressions mêmes qu'on peut lire dans des articles récents de la presse espagnole), comment concilier cette opinion sans preuves avec les données officielles fournies par cette armée même qu'ils cherchent à défendre ?

Clinical and other Notes.

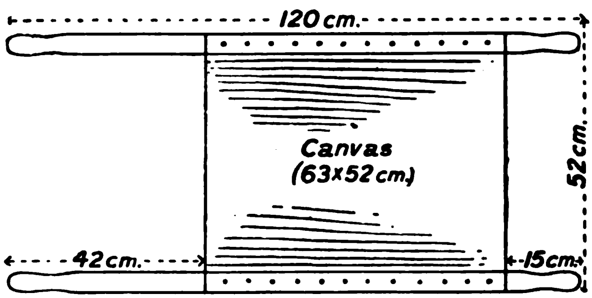
THE NEED FOR A SHORT FORM OF STRETCHER FOR USE IN THE TRENCHES.

By Captain G. K. AUBREY.

Royal Army Medical Corps (S.R.).

The army pattern, Mark II stretcher, is quite useless as a means of conveying wounded through the trenches on account of its breadth and great length.

The breadth of Mark II cannot be altered because of the iron "traverses" which keep the poles a fixed distance apart and, though it is true that in places the width of trenches is occasionally enough to



Plan (open).

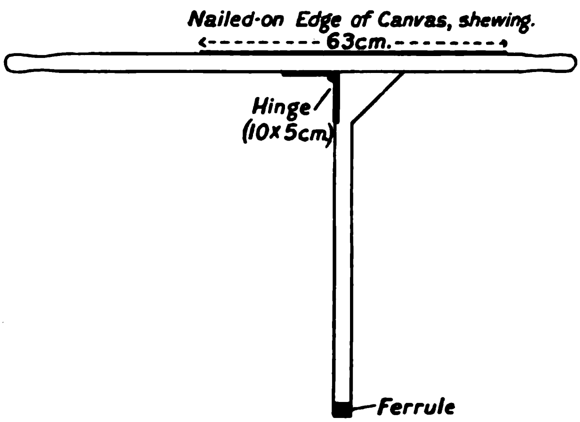
admit of its passage and of its being passed by those coming to and fro, its length absolutely bars the use of it in the trenches, for these twist and turn and double constantly upon themselves *in U-shaped curves* throughout their whole course. One is forced, then, to effect the removal of helpless wounded from the trenches to the Regimental Aid Post under cover of darkness; the bearers lift the man out of the trenches altogether, trusting to luck that none of the stray bullets or ricochets, which are flying about at all hours, will find a mark in any one of the party.

By the help of the simple stretcher which is described below, it is possible to get a man, with tolerable comfort to all concerned, not only through the communication trench, but through the narrower curves of the front trenches.

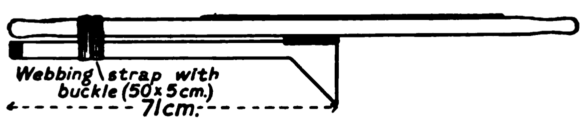
This short stretcher is already in use in the Brigade; it is small and light enough to be carried easily under a bearer's arm, and of sufficient strength to support a 14-stone man. There is no traverse, it is not

needed, and the ability to approximate the handles a little is a great help in rounding a corner.

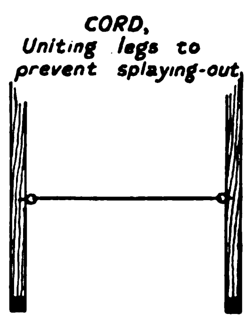
The shoulder slings of Mark II are used, and its pillow, as a cushion, is placed lengthwise on the canvas between the poles; the head and back



Side elevation (hinged legs open).



Side elevation (hinged leg closed).



of the man rest against the breast of the rear bearer, while his feet hang clear of the front bearer's legs.

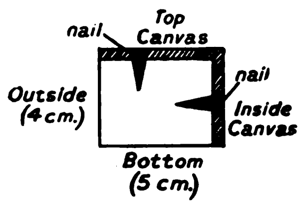
The adjustable buckle strap shown above, tying the folded-up leg to the front pole, can be used to sling and give support to one or other

of the patient's legs, without appreciable inconvenience to the front bearer.

When carrying a wounded man the hinged legs hang from the poles, and are so placed as to take the weight of the patient evenly when the bearers lower the stretcher a little to rest or change, and a very slight effort holds the contrivance steadily balanced.

Section of squared part of poles and legs (5 × 4 cm.).

Section of poles and legs with corners rounded off. (This is indicated in other diagrams by shading.)



Enlarged section of poles (showing attachment of canvas by copper nails).

MEASUREMENTS.

	Cm.	Inches
Extreme length of poles	120	47·0
,, width from outer side of poles	52	20·3
Width between poles	42	16·5
Length of canvas seat	63	24·6
,, front handle and pole to point of attachment of canvas	42	11·5
,, rear handle and pole to point of attachment of canvas	15	5·9
,, legs	71	27·5
Section of poles and legs	5 × 4	2 × 1½
Strap	50 × 5	19·5 × 2
Hinge for leg	10 × 5	4 × 2

If required a bandage or strap can be passed in front of the wounded man's chest and attached on both sides to the shoulder-sling as it passes from the rear bearer's shoulders to the handles.

I do not suggest that this stretcher should take the place in any way of Mark II, when that can be used; nor that it is by any means a perfect pattern even of its kind; it was devised to meet a special need, and I hope that suggestions will be made to improve it and increase its utility.

A CASE OF CHRONIC INTESTINAL OBSTRUCTION DUE TO TUBERCULOUS DISEASE OF THE CÆCUM.

By Lieutenant J. H. M. FROBISHER.
Royal Army Medical Corps.

Tuberculous disease of the cæcum is sufficiently uncommon to be worth recording, and in most cases removal of the tuberculous mass is said to be necessary. This case seems to show that merely putting the part at rest by short circuiting is sufficient, in at any rate some cases.

It is well known that laparotomy is sufficient in many cases to cure a tuberculous peritonitis, and probably may in the same way benefit any other abdominal tuberculous lesion by promoting a fresh flow of serum rich in opsonins.

A Hindu, Hari Pershad, aged 20, was admitted to the Cantonment Hospital complaining of constant pain in the abdomen and vomiting. He stated that he had been ill about two years and had gradually got worse. He complained of pain in the abdomen across the lower quadrant, which was constant and often severe. At times he had more acute attacks of pain radiating over the whole abdomen, usually accompanied by vomiting. These attacks had become more frequent lately. Bowels generally constipated, but he had occasionally attacks of diarrhœa. He had got extremely weak and emaciated, and came to hospital as a last resource. On examination he was found to be emaciated to the last degree.

Abdominal Examination.—A large tumour about the size of a clenched fist was present in the right iliac fossa. The tumour was only slightly movable and tender on pressure. Visible peristalsis was noted after prolonged inspection.

In view of his age and the long history a diagnosis of tuberculous disease of the cæcum was made, and his consent obtained for operation.

Operation.—The abdomen was opened through the right rectus. On opening the peritoneum a small amount of straw-coloured fluid escaped. The cæcum was pulled up and found to be infiltrated with a mass of tuberculous tissue. Tubercles were studded all over the mass and some were present also on the peritoneum of the anterior abdominal wall. The mesenteric glands were slightly enlarged.

A lateral anastomosis was performed between the ileum and transverse colon. The only feature of interest in the technique of the operation was the use of india-rubber tubing instead of intestinal clamps, there being none of the latter available in the station. The india-rubber tubing was passed round each end of the loop of gut to be opened and clamped with artery forceps. The method worked quite satisfactorily. The abdomen was closed in layers in the usual manner.

After-history.—Morphia was required for pain on the night of

operation. A small turpentine enema was given the next morning for relief of flatulence, and acted satisfactorily. Castor oil was given on the third morning and the bowels were opened. The stitches were removed on the tenth day, the abdomen being soundly healed.

On the second day he began to take milk freely, and his diet was rapidly increased until he was on a full diet. He left hospital on the twentieth day, refusing to stay any longer as he felt perfectly well.

His pain had very quickly disappeared and he was putting on flesh. The examination of the abdomen before discharge showed that the tumour had decreased in size to a remarkable extent and in fact could hardly be felt at all. His bowels were acting normally every day, and he was eating anything his caste allowed, a thing he had not done for months.

REPORT OF WORK DONE AT THE LOUISE MARGARET HOSPITAL, ALDERSHOT, DURING THE YEAR 1913.

By Major E. RYAN.
Royal Army Medical Corps.

(1) The number of maternity cases was 491, consisting of 301 multiparæ and 190 primiparæ. Of these 428 were vertex presentations, 11 breech, 3 transverse and 1 a face presentation. Total number of infants born 495, there being four sets of twins. Of the 495 there were 254 males and 240 females. There were 7 persistent occipito-posterior cases, 1 of placenta præviæ, 1 placenta succenturiata, 2 adherent placentæ, 9 stillbirths, of which 3 were macerated and 6 premature; 3 cases of albuminuria, 1 case of accidental hæmorrhage, 1 of prolapse of cord, 2 cases of Cæsarean section for badly contracted pelvis. Version was performed twice and forceps applied only seven times. There were 3 cases of malformation of infants, viz., one cleft palate and two of talipes, one of the latter also had supplementary toes. The mortality amongst the maternity cases was *nil*.

(2) The number of cases admitted for general diseases was 647; 254 women and 393 children. The total admissions during the year, including both maternity and general cases, were 1,148.

(3) The number of women and children who attended as out-patients on Tuesday for extraction of teeth was 320. Of these 115 had nitrous oxide gas.

(4) The number of attendances of women (special gynæcological out-patients) on Thursdays was 520.

(5) The number of surgical operations performed during the year was 483, with 6 fatal results. The abdominal operations numbered 86 and miscellaneous 397.

(I) The abdominal operations included 21 for appendicitis, all

of which were successful. The following were the more interesting conditions found. In 8 cases the appendix was gangrenous. In 6 it was acutely inflamed, containing fæcal concretions, some of which were quite hard. Thread-worms were found in 3 cases and pus in 2. Another was very elongated, measuring seven inches in length, kinked and adherent to the cæcum for several inches. In addition to the above number the appendix was removed in 7 other cases, but not shown under operations for removal of appendicitis, as in such cases the operation was for diseased ovaries or Fallopian tubes, to which the appendix was found adherent.

(II) Cæsarean section: There were two cases, and in both the mothers and children did well.

(III) Cholecystotomy: In one case twenty gall-stones varying in size were removed, after which the patient made a rapid convalescence.

(IV) Removal of diseased Fallopian tubes and ovaries was performed in eighteen cases; all healed by first intention. One was a case of a large thin-walled unilocular cyst extending as high as the ensiform cartilage, containing ten pints of fluid. The pressure from this caused complete prolapse of the uterus; the fluid was drawn off, the cyst with its pedicles removed, and the uterus was pulled up and fixed to the anterior abdominal wall. There were 9 cases of multilocular cysts of one or both ovaries, 3 cases of tubo-ovarian cysts, 3 cases of pyosalpinx and 2 of tubercular salpingitis.

(V) Supravaginal hysterectomy: There were two cases, one successful, the other died six months later from recurrence of malignant disease.

(VI) Ectopic gestation: There were three cases, and all had ruptured before admission to hospital, where they arrived in a very collapsed condition; the ruptured tube and fœtus were removed in each case and all made a good recovery.

(VII) Ventrifixation: There were three cases done for severe prolapse of uterus. One, Mrs. G., was operated on on January 20, 1913, for complete procendentia. She was confined in this hospital on December 23, 1913, and had a perfectly natural labour. Previous to the operation she had not had a child for seven years.

(VIII) Exploratory laparotomy: There were five cases, of which three died; the mortality under this heading is very high, but the cases as under will explain this. One woman, on admission, was extremely collapsed, and complaining of intense pain in the epigastrium, a ruptured gastric or duodenal ulcer was suspected and she was operated on at once, but the case turned out to be one of acute hæmorrhagic pancreatitis, white patches of necrosed fat being dotted over the omentum, and the pancreas was found acutely congested. The peritoneum was so friable that it was with the greatest difficulty the incised portions were brought into apposition. She died eighteen hours later.

Case No. 2 was one of acute general peritonitis, operated on an hour

after admission. The abdomen was partly full of pus, the result of a ruptured pyosalpinx of the right side. The ruptured pyosalpinx tube was removed, the abdomen swabbed out and drained, but the patient died eight hours later.

Case No. 3, Girl E., aged 1 year 5 months, was admitted suffering from suspected tubercular peritonitis. On opening the peritoneum there was a gush of fluid measuring about eight pints. The omentum and intestines were studded with large tubercular nodules; there were four large tubercular masses surrounding the vertebræ. This child died four days later from acute general tuberculosis. The two other cases were operated on for appendicular abscesses, and are not included amongst the operations given above under that head, as the appendices were not removed owing to the fear of breaking down adhesions and setting up general peritonitis. Drainage was used and the cases eventually recovered.

(IX) Intussusception: A child, aged 2, was admitted with the history of passing blood for three days. A large swelling was palpable in the left iliac fossa. The child was very collapsed, so much so that hot salines were given while it was prepared for operation. The "intussuscipiens" consisted of about twelve inches of ileum and cæcum, including the vermiform appendix. The whole was gently reduced. The bowel was dark coloured but had not lost its gloss. The child died four hours later from shock.

(X) Nephrorrhaphy: Two cases, both successful.

(XI) Of the 397 miscellaneous operations there was only one death, as follows: A baby was brought to hospital when three days old suffering from imperforate anus. A plastic operation was done at once, the rectum found, brought down and stitched to newly formed anus, but the child died a few hours later. Amongst the others were curettage of the uterus, done in 52 cases; 5 operations for mastoid disease; 3 cases of perineorrhaphy; 5 cases of colporrhaphy; 33 radical cures for hernia, etc., etc.

A DESCRIPTION OF THE CYANIDE PROCESS FOR THE EXTERMINATION OF BUGS.

By Captain M. J. WILLIAMSON.
Royal Army Medical Corps.

As a medical officer in charge of troops in South Africa I have on several occasions found it necessary to wage war against the ordinary bed bug. The little pest seems to be particularly fond of the barrack room as a cosy, well-warmed habitat in which to live and breed. The bug seems to be possessed of enormous vitality, and resists all ordinary methods of bringing about his death.

Thorough scrubbing of the whole building with cresol solution, anointing the bedsteads, walls, etc., with paraffin, and fumigating with

potassium permanganate are only, if at all, partially successful. Careful attention given to the beds and bedding by each soldier every day will do a great deal in keeping the barracks free from vermin, but some method of extermination is really necessary to absolutely free barracks of them.

The only method which has proved successful as a means of doing this is the cyanide of potassium fumigation process. I carried out this plan in dealing with vermin in the Simon's Town Barracks with marked success. The process has a very unenviable reputation for danger, but, with any ordinary amount of care, it is really quite free from risk. All fatal accidents which have been reported have been cases of persons going into a sealed-up room, which was being fumigated, for some article of clothing, etc., which had been left behind.

The Method.

(*a*) *Ingredients required.*—The three ingredients necessary for the production of the gas are cyanide of potassium, in lump form and of the purest commercial grade (98 to 100 per cent), commercial sulphuric acid of full strength, and water. The cyanide of potassium should be white and crystalline, but dark discoloration and honeycombed surfaces do not necessarily denote inferiority. There is always a certain amount of powdered cyanide in a tin. This powdered material gives a full reaction, but it is a quicker and more violent one, and the use of it should be avoided.

To ascertain the amount of cyanide and sulphuric acid to be indented for, the following formula should be taken as a guide: 1 oz. of each chemical, cyanide of potassium and sulphuric acid, and 2 oz. of water to every 100 cubic feet of space. This formula is only hard and fast in relation to the proportion of the ingredients. The ratio of the chemicals to space is only a guide, as special conditions may indicate higher charges per 100 cubic feet. Thus, when there are deep cracks or doubts as to the thorough closure of the room, a greater quantity of cyanide would be necessary, e.g., an ounce to 60 cubic feet. No allowance should be made for furniture or other contents of a room.

(*b*) *Preparation of Spaces.*—The spaces to be fumigated should be made air-tight. A fatigue party of men, under a responsible non-commissioned officer, provided with large supplies of old newspapers and flour paste, can be trusted to do this. All ventilators, window sashes, etc., should be pasted up on the outside to avoid the chance of sheltering any of the vermin. Chimneys should have two thicknesses of paper pasted over the tops of the chimney cowl. As a rule each room should be treated separately, but two connecting spaces may be treated as one unit.

Bedding, clothing, etc., should be scattered about the room, care being taken not to shelter crevices in the bedsteads or walls, and to expose the entire surfaces of bedding, etc., to the action of the gas. Articles should be hung on nails on the walls or on chairs. There should be no vessel

containing water in the room unless the vessel be absolutely air-tight, as water absorbs the gas and thus causes loss.

(*c*) *Preparation for Operation.—Generating vessels* should be selected, and the requisite number placed in the centre of each room on two thicknesses of paper. The best article for this purpose is the ordinary paraffin tin. If a small charge (a pound or less) is to be used the tin should be tilted up in order that the mixture may cover the cyanide. The cyanide should be weighed out in the requisite amount for each charge, which should be placed in stout paper or linen bags. No single charge should be more than three pounds of cyanide. If more is required for one room it would have to be divided into two. Each charge should be placed one foot away from its corresponding generating vessel and should have the top of its bag neatly rolled so as to be readily gripped.

Water should be measured out into the tins in the required quantities.

The sulphuric acid should be poured out into canteen beer mugs or other receptacles in the correct proportion, and these mugs should be placed beside their corresponding tins. It is advisable for operators to wear rubber gloves during this and subsequent proceedings, as the acid may splash if not very carefully handled.

Another matter that needs preparation at the last minute is the rendering of the exit door of the room air-tight. No door is air-tight when closed, and a good plan is to have strips of paper with large overhanging flaps pasted on to the outside lintel of the door. The free flaps are liberally covered with paste and these are pressed down on to the door after the operators' exit.

(*d*) *The Operation.*—Everything is now in train for the dropping in of the cyanide, and every man except the operators should be cleared out of the building. For the actual operation it is necessary to have an intelligent assistant if a large number of rooms are to be done. Lance-Corporal Davis, R.A.M.C., did this part for me, and with his aid operations were carried through without a hitch. The first act consists in pouring the acid into the water. On no account should the water be poured into the acid or bad splashing will result. The mixture thus made generates heat and it is necessary to add the cyanide while the heat is retained. It is therefore advisable for the assistant to precede the operator and perform this initial action when more than one room is to be fumigated. The operator, armed with a pair of ordinary tongs, then seizes the bag of cyanide and, holding it at arms' length, drops it into the fuming mixture and bolts for the door. My experience is that there is always plenty of time for exit, as it takes a perceptible period for the sulphuric acid to penetrate the bag. The room should now be left sealed up for at least four hours, or longer if this can be arranged for.

Ventilation.—After the period of exposure has elapsed as many windows and doors as can be opened from the outside should be thrown open. The question of opening upper windows was dealt with here by

driving a large screw into the sash of the top half of the window and attaching thereto a stout rope. A stout pull at this rope opened the window. It is advisable to leave the room to air thus all night, no one being permitted to enter before morning. It is during the ventilation stage of the proceedings that risks are run by civilian operators, as they enter the room, after half an hour's ventilation through an open door, to open up the windows. This is quite an unnecessary risk, of course, and in the Army no danger should attach to this portion of the proceedings. All refuse left should be buried with the tins that hold it.

Precautions.—In fumigating barracks it is advisable to have all troops removed from them and placed under canvas. During the fumigation and ventilation stages sentries should be placed at points of vantage not nearer than twenty yards from the building. They should be instructed not to allow anyone to approach the building, and should be impressed with the deadly nature of the gas. We had a good ocular demonstration of the capabilities of the gas at Simon's Town. In endeavouring to open one of the upper windows of the barracks a cord broke, so I threw up a stone and smashed a pane of glass. A pigeon, at that moment, flew across just above the window and must have got into the stream of escaping gas, for it fell fluttering to the ground as if it had been shot. The hole in the window was not more than three inches across. The bird eventually recovered.

In conclusion, I think the process with any ordinary care can be carried out with perfect safety to operators and others. It certainly is the only efficacious method of dealing with vermin. After the fumigation we found hundreds of bugs, who would never bite or breed again, lying about the floor, and since then I have seen no evidence of bugs in these barrack-rooms.

Echoes from the Past.

SHORT SERVICE FOR THE ENGLISH SOLDIER IN INDIA.[1]

By G. J. H. EVATT, M.D.
Army Medical Department, attached 25th K.O.B.Regt.

THIS paper was written at Fyzabad, Oudh, Bengal, India, in 1875. I was still serving with the 25th K.O. Borderers, which I joined as a regimental officer in June, 1866. I had been with the regiment during the period of stress and strain when the campaign to abolish purchase was in full fling. This campaign successfully ended, the short service struggle held the field. No one serving to-day can imagine what the strength of the old regimental feeling was, and the names of Lord Cardwell, Sir Henry Campbell-Bannerman, and Sir John Adye, who were keen advocates of short service, were anathema in the Army. I had already watched the action of the Tropics on the soldier, as I had served in Ceylon and in India from 1866 onwards, with the 25th K.O. Borderers. I had seen also the old long service regiments of the East India Company's service, like the old 101st Regiment, the Royal Bengal Europeans.

This paper received the full consideration of Sir Henry Campbell-Bannerman, and of Sir John Adye, both of whom complimented me on its production. Sir John Adye, in speaking of it, said to me, "We were all considering the question from various standpoints of custom of the Service, and regimental *esprit de corps*, and such like points of view, when there came from India a paper that altered the basis of argument, and moved it into the region of scientific investigation and cold calculation."

INTRODUCTION.

(1) We purpose, in the pages that follow, discussing some aspects of the Short Service Question with special reference to its applicability or the reverse to the Imperial Garrison in India. We propose to inquire whether advantages or drawbacks are likely to ensue from the application of short service soldiering to the English Army stationed in this portion of the Empire, and to

[1] Reprinted from the *United Service Institution Journal of India*, Journal No. 23, vol. v, of A.D. 1876.

contribute some individual views towards the formation of a public opinion on this subject. No question that we are cognizant of is so rapidly coming to the front as this one. In a year or two the soldiers enlisted for six years under Lord Cardwell's Act will be time-expired for their period of service with the Colours, and it seems advisable at this time to examine how a short service system for India is likely to affect England in her Imperial position, India, and the Army.

(2) A question of such deep importance, and so wide in its bearings as this, must be discussed in a wide and liberal-minded spirit. We must discuss it firstly in its English Imperial aspect, as to how it affects the Mother Country. Secondly, in its Indian aspect as concerning the Indian Government, the question of expense to the Indian revenues, and its general applicability to this country. Thirdly, as to how it would affect the military efficiency of our Home Army, and of our garrison in India. And fourthly, in its medical aspect, as concerning the personal health and well-being of the individual soldier. Any settlement or attempt at settlement of this question that is not based upon a just valuation of each of these aspects will certainly fail, and we may rest assured that unless the decision is thoroughly in accordance with modern ideas it will be quite useless. We cannot stem the current of modern ideas; the true aim should be to divert that current as best we can to do the work we want done.

(3) In any consideration of this question of the service of the British soldier in India we may lay it down as a first principle, that any attempt to revert to the system of a Local European Army in this country is quite out of the question. We take it for granted that the English soldier is in future to be a wholly Imperial servant, and that all questions referring to the Army will be dealt with from an Imperial point of view. Without entering more fully into the invidious question of the efficiency of old Company's European regiments in India, we may conclude that the step taken in 1860 of abolishing the Local European Corps in India, and followed up since in the Cape, St. Helena, Canada, and Ceylon, is a sound principle and not to be departed from. We cannot allow the English soldier to be hired or dealt with by any local administration; he must remain part and parcel of an imperial organization, a visible sign of our imperial existence.

(4) Practically, as we shall note further on, India secures by the existing long service, or coming short service system, an ample supply of intelligent subordinates from the ranks of the Imperial

battalions, to fill the petty officers of the local Indian Administrations. Without any trouble in enlisting special men, without the drawback of taking a mixture of bad and good together, as she would have to do in any general enlistment, India skims off, as it were, the cream of the non-commissioned officers and men of the British Army in India for her service. So long as they behave well she keeps them; the moment they misbehave she returns them to the Imperial regiments, an easy mode of getting rid of them, and one quite impossible had she regiments of her own. It is literally by such subordinates—the cream of the Queen's European regiments—that all the sub-departments in the country are carried on. The Commissariat, the Public Works Department and the Canals are ably worked by these men. They are nominally soldiers, but really military civilians, in the pay of the local administrations, employed during good behaviour, and liable at any fault to revert to their position in the rank and file of the European corps. Such a privilege granted to India more than makes up for any supposed injury she may imagine she suffers, in not having European corps of her own from whom to choose subordinates.

(5) It seems fair in the commencement of this paper to state that its general tendency will be to place in prominence the various arguments which we believe have weight in favour of the short service system. In thus taking the reader into confidence, it is but just to ask that the various arguments put forward may be considered. Short service must be considered. It is in vain laying down fine theories that cannot be carried out. Short service must be fully and fairly discussed, the opinions and the prejudices of the Service notwithstanding.

(6) We shall divide this question for convenience of examination into four heads, viz.:—

(*a*) The Imperial aspect of short service in India as concerning England in her imperial and military position.

(*b*) In its Indian aspect as concerning the Government of India, the question of expense and efficiency.

(*c*) In its military aspect, as to the bearing of the question on the strengthening or weakening of our military position in this country.

(*d*) In its medical aspect, as concerning the personal fitness of the individual soldier.

Finally it would seem necessary to discuss some changes, which the introduction of such a system would necessarily entail in the routine of Indian service.

SECTION A.—THE IMPERIAL ASPECTS OF SHORT SERVICE IN INDIA.

(7) We believe that, viewed from an Imperial point of view, nothing but good will result to England and the Empire from the introduction of short service for the European soldier in India. By short service in India we mean service under six years in this country, and averaging five years for each individual man. It is needless to point out that short service refers only to the private in the ranks, and to a small percentage of non-commissioned officers. In any short service army, a backbone of long service and thoroughly professional officers and non-commissioned officers is a *sine qua non*. This is granted in all discussions on the subject. We must by every possible means keep the serjeants on the permanent long service backbone of the army. Good pay and good pensions can secure this without any difficulty.

(8) It is further necessary to note, that in discussing this question we do not propose to relieve regiments or battalions, as such, every five years. The relief will be entirely individual. It is of much importance that the short service soldier should not come to India as one amongst 800 in a battalion all equally ignorant of India as himself, and changed every five years; what is wanted is that the permanent cadre of officers and non-commissioned officers should serve for the same term as at present, and that their private soldiers should alone come and go for five-yearly periods. The change of battalions every five years would disturb the roster too constantly. It would bring out to India a crowd of soldiers, all in the same battalion, with officers and staff quite ignorant of the country, and this we do not want. The Colours should remain their full ten or twelve years in India, and the individual men alone be relieved as their period of service for five years expires. All errors made in India in the way of interior economy or of climate exposure are made by new regiments just arrived in the country, in which, as often happens, no one knows the Indian routine. It takes time to learn such routine. To bring out every five years raw battalions from England is to court serious losses from ignorance of the customs of Indian service. For the sake of convenience we shall examine each point of the Imperial aspects of short service in India separately.

(9) (*a*) *The Empire is benefited* by the English soldier coming for a certain time to India, and taking his share of Indian service. We have adopted short service with the Colours, and handing over to the Reserve afterwards, as the rule for the future in our English

military system. Doubtless there are arguments against this system, but though it means a termination to our splendidly drilled old soldier army, and although it means infinitely increased work for the officer and non-commissioned officer, it assuredly means national military efficiency. Viewed from such a standpoint we may freely sacrifice much of the old perfection in parade movements that so long made our army unique in Europe. With a short service system then it becomes necessary to force, as it were, the military knowledge of the recruit. It becomes necessary to compress into five years of active duty with the Colours the amount of knowledge the average soldier gained in twenty-one years long service under the old system. This can be easily done, and the more insight, and the more intimate knowledge we give the man of his profession in those five years, by so much is England the gainer.

(10) Now nowhere better than in India can a man be taught soldiering. It has been said and with some truth in the olden time that India may be to us what Algeria was to France under the Third Empire. A school of lax discipline. A school for happy-go-lucky campaigning. A country for gaining decorations in, but for forgetting all real military knowledge. The liability of such results is every day passing away in India. European efficiency is every day making greater inroads upon old Indian institutions, and the luxurious campaigning of old days is now merely traditional. Properly worked, India should be the rugged nurse of the soldier. Here the English private, removed from the dissipations of an English garrison town, is thoroughly under control. Discipline grasps him with a hold from which escape by desertion is impossible. Surrounded by a population which may perhaps one day become aggressive, he feels more on the *qui vive* than he ever could be in any home garrison. He can see camp life most thoroughly. Long marches are the rule. He sees the commissariat working in a far more complete way than in England. Ample leisure exists in which to study his profession, or to learn in the school. Removed from his friends and relatives, comradeship and the regimental bond becomes far closer than in England. If a man is to serve five years in the Army, and then pass to the Reserve, every year he passes in India of that five is, for the reasons before mentioned, worth twice the time spent in England.

(11) All we have written in these preceding lines refers to the first five years of a soldier's life in India. In these years of enthusiasm and bodily vigour the man is every day improving.

Beyond that period to our mind the private soldier, if still in the ranks and not a non-commissioned officer, begins to deteriorate morally and physically. He sinks into the indifferent type of Indian soldier. He begins to be listless and used up. He has survived his enthusiasm for the new country, and to enjoy the greatest ease may become his aim. He strives to get married. Such a man had far better return to England. If a man is still, at the end of five years' service, a private in the ranks, he has stamped himself as a man devoid of energy, unless in very rare cases. Such a man in the barrack-room is deadly to the enthusiasm and energy of the recruit. It were far better to offer him any pension to leave the active ranks than to allow him to teach the young enthusiast that all is vanity in the military life.

(12) After this period, too, as we shall notice further on, the commencement of climatic deterioration sets in. Previously, his diseases were those to which in any colony he might have been liable. Now commence the diseases of Indian deterioration. It is just before this period he should be returned to England, and to the Reserve there. Such a man knowing the Army life, accustomed to a vigorous discipline, not too old to take up heavy labour at home, able if he choose to go home with money saved in India, is an excellent Reserve soldier, but in the Army ranks he would be terribly in the way. If we kept him with the Colours he would demand a wife, and that alone entails innumerable drawbacks. Long service means married service. We must reduce the long service married men in the Army to the fewest possible to obviate such a dead weight. The officers and the non-commissioned officers, who must be long service men, alone can be permitted to marry while in the Active Army. This would be a *sine qua non.* England then is benefited by having her soldiers trained in a good school in India instead of living in a home garrison.

(13) (*b*) *The Reserve at home is made more efficient* than it would be without the Indian trained soldier in it. This follows from the preceding argument.

(14) (*c*) *The Imperial Spirit is Fostered.*—The English peasant coming out to India, and seeing there, and on the way out how great an empire his country rules, has his mind expanded to a great degree; education working hand in hand with his travelling does much for the man. Such an individual returning while still young and vigorous to England as a Reserve soldier is somebody, and no doubt induces young lads to enlist.

(15) (*d*) *Money can be saved in Five Years' Indian Service.*—

India must pay for her Imperial garrison. They are cheap at almost any price. They represent English manhood, an article every day rising in value. The English non-commissioned officers' and privates' pay in India should be to their English pay as the pay of a captain in India is to the pay of a captain in England. This is the true principle. Thus paid, a stupid man who cannot hope to become a serjeant can at any rate save money and go home after five years with a very good sum in his purse; he can rarely hope to do this if he has been serving all the time on English pay in England. Here in India he has few dissipations, and almost of necessity saves money. There are, besides, many paid regimental appointments in this country held by private soldiers, all tending to give more pay.

(16) A man should be well paid in India. India secures her garrison of European troops at a cheap rate, because she pays only for healthy, strong men. The moment a man breaks down he is sent home, discharged, and becomes a dead-weight on the Imperial pension list. This is hardly fair; men break down from Indian exposure, and to maintain Indian State existence. Men so breaking down have a claim on the Indian revenues. India escapes the dead-weight of a non-effective charge for broken-down soldiers, and Chelsea Hospital Pensions supply the man. If such be the case, then while serving in India he should be very well paid. Remembering that she escapes the pension charges, India may fairly pay him well, while the soldier there serves with the Colours.

(17) (*e*) *The Return of Indian Invalids to England ceases.*— It is necessary to explain that by Indian invalids we mean men whose disability is traceable solely to Indian service. The great bulk of the invaliding for the first five years is such as would occur in any garrison at home or abroad. It is the invaliding of the Imperial character. This first five years' invaliding is very different from the invaliding of Indian deterioration that sets in about the sixth and seventh year in India. India is little to blame for the invaliding of the first five years; she is solely to blame for all after. When we say India is solely to blame, we do not say Indian climate, we mean the Indian life of the average long service soldier. The return of the Indian soldier, broken down from Indian long service, to England is an Imperial loss and calamity. He is really a dead-weight on the country. He is unfit for any heavy labour. He is fit only to carry parcels and letters as a commissionaire. In addition to the idle habits long service soldiering has too often taught him, actual organic disease has grasped him,

and he finds himself unable to work hard. Such a man going home to England is a weakness to England. Now the invalid who breaks down in the first five years is not a weakness to England from Indian causes. He would probably break down in Woolwich as well as in Meerut or Lucknow. He is unfit perhaps for a soldier hereafter, but he is quite fit for civil life. Not so the long service Indian invalid. He is unfit for either soldier or civilian. He is hopelessly broken down. We avoid producing this man by having short Indian service. We return him home before Indian constitutional deterioration properly so called sets in. We can send the man home fit for active labour, able to work at a trade. Not too old, but wedded to the diligent idleness of the long service private soldiers' life, and on this account we say England would gain by short Indian service.

(18) (*f*) *No Married Soldiers in India. No Waste of English Lives.*—The more we examine the married private soldier as an Army institution, the more terrible a dead-weight he seems while serving with the Colours. If we keep men twenty-one years with the Colours, we must let them marry. That goes without saying. Now nowhere more than in India is the married private soldier a thorough anachronism. He is wholly out of place. It is a downright waste of English life to let him exist in the country at all. As a necessary *sequela* of our long service soldiering system, we are year by year in India sacrificing hundreds of English children who cannot possibly be preserved. Fancy a regiment of Infantry with 100 married women and 150 children moving in the rear of the column. What a terrible dead-weight. The moment a regiment under long service rule gets under orders for India, the men, often stationed in some garrison town, get permission to marry literally by dozens. Selection in such cases is not very marked, the man marries the first passable girl who will take him. Let us follow his career. He and his wife, and his married comrades, occupy one-sixth of the troopship in its best and airiest place. A hospital is provided on board for his sick wife and children. Medical comforts on an expensive and liberal scale are carried for her. Scarlatina and measles are liable to be carried into the ship by the children, and it spreads amongst the fighting men. They arrive at Bombay. One-fourth of the train is taken up by the married privates' wives and children and their luggage. They arrive at Deolalee. Large married barracks are built specially for them. They come on the Indian Government pay list of Rs. 8 per woman and Rs. 2·8 per child. They again fill the train and encumber the march in going to

the regimental station. Women and children perish in a terrible percentage year by year in this country. Every epidemic disease fastens first upon them. Large tracts of cantonments are built upon to provide barracks for them. Special hospitals are provided for them and special nurses. The schoolmaster, who ought to be teaching the rank and file, is teaching their children. A mutiny occurs: they form a mass of unprotected women, or one-fourth of the fighting men are withdrawn from the field to defend them in a cantonment. A camp of exercise takes place; one-fifth of the regiment is to remain behind, being married. A campaign beyond the seas takes place; form a depot for the married women. They get sick, and a special share of hill sanitaria is set apart for them. Now if the married private is to exist, his wife and children deserve all this and more. If we bring them to India we must care for them tenderly. But why bring them? The married private is really an encumbrance in the service. If he is killed a helpless widow and children fall on the country for support. Would it not be better then to have short service men, who cannot possibly marry and let the permanent cadre alone be married. With twenty-five married serjeants and some married officers, not much injury is done to efficiency, but add on sixty married privates, and it becomes a really crying evil. It was the necessary result of an old-soldier army, but is it necessary to-day? Certainly not, if we introduce short service into this country. The death rate of the English women and children of the rank and file of the army is very dreadful, and by refusing to allow the long service married man to come to India, England imperially must be considered as a gainer. In ten years between 1860-69, 1,180 women and 4,000 soldiers' children died in India. (Vital Statistics, Bengal Presidency, Tables clxxvi and clxxvii, Bryden).

Section B.—Indian Aspects of Short Service.

(19) We now turn to the Indian aspects of the question, having, in the preceding section, noted the Imperial advantages. At first sight it seems impossible to say anything to combat the idea of expense in relief, always supposed to attend a short service system. This, however, has to be considered very fully. But in the very outset we may state that the duty of India is to pay for her garrison. Having no European force of her own to enlist at home, no mixture of good and bad bargains to accept as soldiers, able to take the cream of the British Imperial regiments for her

sub-departments, with no heavy pension list which would certainly exist had she European levies of her own, India can well afford to pay heavily for reliefs. But we shall show easily that she can save money by this short service system in many directions, and this money can be employed in defraying transfer charges. But it is of paramount importance to state our belief that very rarely any question of Indian expense should be permitted to interfere with direct Imperial advantage.

(20) *India would secure Young Active Soldiers.*—By this system of short service, India would receive young enthusiastic men in the prime of youth, from 20 to 25 years of age. The old soldier class, that is, the class over seven years' service, would no longer form a part of the rank and file of the Army. If a man wanted to remain in India, he should qualify himself for the non-commissioned grades. In the ages under 25 years a man is full of enthusiasm and vigour, able to endure fatigue, and desirous of distinction. After 30 years of age the soldier dies off rapidly in India. For a man over 30 years of age to come to India as a private soldier is quite useless. He will certainly die in the field. This was proved very thoroughly by the sickness of the 6th and 73rd regiments during the Mutiny.

(21) *Any Man permitted to remain after Five Years' Service would be thoroughly good.*—By laying down the rule that no private soldier was to remain in India after five years' service, unless on certain conditions, an immense impetus would be given to many men, who would desire to remain in the country. These conditions should be, that of being serjeants in the regiment; having passed into Roorkee and the military sub-departments; having passed the lower standard ; having so much money amassed in the savings bank ; and such-like regulations. Soldiers will, many of them, like to remain in India. If they desire it, it should be a boon to be gained by special service as above. By such a system, India would strain out, and keep in India, the cream in intelligence and conduct of her European garrison ; and those who were either so careless or so dull as to be unqualified in the ways we have laid down would be returned to England. We do not need in India the slothful, listless stamp of soldier. Above all things we do not need the married private of long service. If India enlisted men direct for a local army she would be infinitely worse off than she now is, in the way of absence of efficiency and increase of expense. In the first place she would have to offer high pay and pension ; further she would have to take the good and bad recruit according as he enlisted,

but now she takes only the intelligent serjeant of the Queen's troops. She would have to allow her private soldier to marry, because they would certainly have to be long service men, and a heavy pension list would also exist.

(22) *New Ideas from England.*—By the interchange of officers and men from England, India is kept up to European ideas in weapons, equipment, and modern military ideas. England no doubt benefits in return by the interchange with India, as we know that many military improvements came from the Local Indian Service.

(23) *Question of Cost.*—The existing rule of battalions remaining out ten to twelve years need not be changed. On the contrary, it would be hopeless to attempt to relieve battalions as such every five years. We do not want to bring out to India a crowd of officers and soldiers, all in the same corps together, and all equally ignorant of the country. We want the reliefs to be wholly individual reliefs. Let the battalion vacancies be filled up by recruits from England, but let the recruit join in India a battalion that knows the country and its ways. Two hundred men thus arriving out each year do not disturb the tenor of regimental life, but soon find their places divided amongst eight companies in a battalion. But great confusion and disorder would reign if every fifth year one-fifth of the battalions in India were to go home and one-fifth from England arrive out. By causing the relief to be individual all such confusion is averted. Now, with reference to cost, it is necessary to record that India would save immensely by abolishing the married private, the incubus of long service soldiering. She would save thus: (*a*) By having the married quarters in the troopships available for soldiers, as the serjeants would alone be married; (*b*) by having no train accommodation necessary in India; (*c*) by almost complete abolition of married quarters in cantonments; (*d*) by abolition of regimental female hospitals, one per station being ample for the few serjeants' wives and children; (*e*) by abolishing the family grant, averaging Rs. 10 per married family in payment, in addition to the cost of quarters; (*f*) abolition of the Lawrence Asylums, except for Eurasian children. The married privates' children would be drafted from India.

(24) *Efficiency of her Garrisons.*—The married soldier removed or reduced to a minimum, we should be able to bring into the field nearly every man in a battalion. To-day when a campaign occurs one-sixth of the men are kept back to guard the married women. India would gain then in efficiency by having every man available in case of a campaign.

SECTION C.—MILITARY ASPECTS OF THE QUESTION.

(25) When looked at from the military point of view the following aspects present themselves :—

(*a*) Good reserves of men accustomed to field work, accustomed to marching, and full of regimental spirit, are formed in England. These men would be a backbone of strength to the Reserves in the day of trial.

(*b*) Discipline can be very exact in India, far more so than in England, where desertion is so much the rule. England, therefore, in a military aspect, would gain by sending her young soldiers out here. The hold of the officer over the soldier is far greater in India than at home, and this is an advantage.

(*c*) The English soldier deteriorates in India as a fighting man if he remains more than five years out in a private's grade. If before the end of his five years' service, he has not risen to a serjeant's rank, or has not passed the lower standard examination in Hindustani, or passed the examination into the Roorkee Engineering College, or has not shown himself specially useful and handy in some regimental employment, it is far better to send him home to England and the Reserve. After five years' service, more or less, the relaxing effects of the Indian climate begin to tell upon a man's constitution and habits. If he be active and energetic enough to struggle against this tendency, he may conquer it. If, on the contrary, he is careless and listless he may sink, as many old soldiers do, into a useless and idle being, who is a bad element in any barrack-room. Such a man had far better be returned to England. There hard work and an invigorating climate may again waken up life in him, but to keep him in India is to encourage him in becoming a drunkard. All medical evidence, too, goes to prove that a soldier after 30 years of age, and still doing duty as a private, exposed to sentry duty, and the wear and tear of a soldier's life, soon ages and becomes debilitated. Such men are useless for field service, and once stricken with disease never rally. Young men, on the contrary, even if attacked with sickness, have the power of rallying, and often recover. The period of active degeneration in India from a physical point of view is after the seventh year, but a certain way to avoid it is by returning the men who do not suit the Indian climate after they have been five years in India. There is a lazy, idle stamp of old soldier seen in every Indian barrack-room. He is the bad element there. He knows where liquor can be purchased surreptitiously. He teaches the young soldier to grumble at all fatigue duties. He is the leader

of complaints in all times and places. Such a man is useless, and worse than useless; he makes other men bad. To get rid of him into the Reserve is often a great boon.

(26) (*d*) *We secure the Enthusiastic Young Man as a Soldier.*— The soldiering life is one of terrible monotony in peace time. Routine holds the English soldier in a grasp of the strongest kind. Perpetual parade and barrack square drills, continued for years, soon kill all interest in soldiering. What we want is to secure a stream of young men in the days of their enthusiasm, and work them hard during the few years when enthusiasm exists. After it begins to pass away and monotony is settling down upon the man we must get rid of him to the Reserve, if we would save our recruits from being injured by him. With young men properly handled by good officers any amount of work can be got through, and in the ranks of civil life the Reserve soldier will be compelled to labour until the day when any mobilization of the forces calls him to his place in the active battalions. By careful training and continual teaching, such as must be introduced to make the short service soldier a good one, we will make of the young man in five years an infinitely better being than twenty-one years of busy idleness did for the old stamp of English soldier. These old soldiers turned adrift at 40 years of age with a small pension, accustomed to idleness, unacquainted with any trade, so enfeebled by long service as to be unable to take up any hard labour employment, accustomed for twenty years to be cared for like children: such men are encumbrances to any nation, because they are unable to help themselves. Crowds of such men are to be seen in every city in England, striving to earn a living by carrying letters and suchlike labour. Such men will no longer be seen if short service gains the day. If a man remains twenty-one years in the Service, he can only do so by becoming a serjeant early in life, and an ample pension should be his reward. The short service soldier will be returned to civil life thoroughly wakened up, while vigorous and strong, not enervated by prolonged barrack life, and unaccustomed to the idleness of the old soldier. In civil life, helped on by his retaining pay, he can make his way in a trade far better than an old soldier of 40 could, and hence the country gains. But the Army gains most of all. It secures young men for the active battalions. For such youths, no amount of teaching can be too much. They can be taught everything appertaining to their calling, and the Army with young men in it can become a great school for the education of the adult male population.

(27) (*e*) *Advantages in having no Married Private Soldiers.*— The married private soldier is thoroughly an encumbrance; by getting rid of such a being military efficiency is promoted to a great degree with a short service system. Instead of having a hundred married women in a battalion, twenty-five will be about the limit, and they will be the wives of the serjeants, who alone will be permitted to marry. When a man who is a private soldier desires to marry, he must at once join the Reserve. In India the married soldier is greatly in the way. His wife and family require protection in time of war, and by doing so withdraw fighting men from important duties in the field. Sickness which haunts the married quarters, and there first of all discovers the weak points of sanitary conditions, will be much diminished by the abolition of the married private. The school, instead of being filled up by soldiers, is now filled by soldiers' children, and the schoolmaster, whose real duty is instructing the rank and file, is wholly employed with the soldiers' children. Making every allowance for married serjeants and such-like cases, the system of unmarried privates will bring at least 4,000 extra soldiers into the field in the Indian Army alone.

(28) (*f*) *If Soldiers desire to serve in India demand of them Special Qualities in Return.*—Let us remember that if soldiers desire to continue serving in India it is a boon that cannot be granted without demanding something in return. Let us keep the permission to remain in India as the reward for special labour in certain directions. Thus we have in hand a fillip to study and to attention to duty. Let us say no man shall remain in India who has not a first-class certificate in education, or who has not passed in the Hindustani language, or who is not a non-commissioned officer. By thus keeping the boon of Indian service as a reward for certain good points in a man's service we do good to India and to the Army, as we encourage hard work and study.

(29) (*g*) *In Case of War in India the Men sent out from England, who had previously served in the Country, would be better able to stand the Climate.*—Dr. Bryden says ("Vital Statistics, Bengal Presidency: Sickness and Mortality, European Troops," Report I, Section III, p. 38): "The old soldier landed in India dies or is invalided, and the old soldiers are the men above 30." During the Mutiny war of 1857-1858 the old men of the 6th and 73rd Regiments in particular suffered, and the 6th Regiment in particular was ordered into cantonments, the Commander-in-Chief fearing it would be rendered useless for service by the death-rate.

Advantages from a military point of view would be gained by the reinforcements coming out from England having previously served in India and been more or less accustomed to the country.

SECTION D.—MEDICAL ASPECTS OF THE QUESTION.

(30) The medical aspects of the short service system for the European soldier in India are most important. If it be found that young men stand the climate well, rally better from severe diseases, have more elasticity of constitution, and suffer less from diseases of India deterioration, it will be a great point gained. If, on the contrary, it is found that long service soldiers are better men, stand the climate more easily, do not sink under attacks of disease, and do not deteriorate in this country, such results would be arguments against short service systems, and would have to be dealt with.

(31) Now, in all questions concerning the English soldier's physical fitness in India it is necessary to remember that what would be called a vigorous young man in England would, in the ranks of a battalion in India, be considered an old soldier. Such is the wear-and-tear of an average long service English soldier's life, such the bad effects of varying climates, guard duties at night, a heedless, careless existence as regards food and drink, and indulgence of the passions, that a man over 30 years of age in our Army, if still a private, is practically an old man, and of little use for active service in the field in India. We know from experience during the Mutiny that to bring out to India soldiers of 30 years of age, who have not been before in India, is practically useless. Such men die off at once on Field Service, their constitutions being unable to adapt themselves to the exposure to the climate a private soldier's life entails. This truth is proved very clearly in Dr. Bryden's statistics of the European Army in Bengal. This fact established, we know that at any rate the English soldier for service in India must be under 30 years of age.

(32) We also know that the soldier who has served in India more than seven years without a change to England is liable to a very high death-rate, and to an invaliding rate of a most startling amount. "The British soldier can withstand the effects of the Indian climate for a limited period only." (Bryden's Statistics, p. 41.) "Whatever body we may choose for illustration, the rapidity of the increase of death-rate with age is most striking. Whether under exposure, in the routine of cantonment life, or in the special conditions of the newly arrived body, the phenomenon

is constant" (Bryden, p. 12). The ratio of liability to death, per 1,000 men, on the average of the six years, 1865-1870, was—

Under 20	..	..	..	11 per 1,000
20 to 24	..	..	..	19 „
25 to 29	..	..	..	25 „
30 and up	..	..	..	43 „

"We have no difficulty in recognizing that the young material is that best qualified to stand the climate of India" (Bryden, p. 16). And for these reasons, when young men are attacked with disease they recover, but old men die. "The death-rate of 1871 shows that the death-rate for the men above 30 has been consistently double that of men below that age in each presidency" (Bryden, Report II, p. 12).

(33) The truth about the English soldier's health in India seems to be this. If he comes out young (20) he is liable for two years to suffer from one special disease only, and that is typhoid fever. During these two years the death-rate of the young men is due almost entirely to typhoid. "Enteric (typhoid) fever is the one disease of India by which the young soldier dies" (Bryden, Report II, p. 34). Of course during these first two years young men break down from heart disease and consumption in India, as they would in England; and for these men India is not very specially to blame. The death-rate and invaliding rate of the young soldiers, apart from typhoid, is very similar to the death-rate and invaliding rate of other stations out of India.

(34) The English soldier in India, after being three years out, emerges as it were from a stormy sea of death by typhoid and invaliding from Imperial causes, into a belt of calms, which extend from the third to the seventh year. During these calm years dying and invaliding are at a minimum. The young men who would break down, no matter where they were stationed, and the really delicate youngster, have either died off from typhoid or been invalided for what we may call Imperial or non-Indian causes, and as yet the actual Indian deterioration, dying and invaliding, has not set in. During these four years the soldier, according to our present system, is at his best; he is young and active, has emerged from the weak period of his boyhood, and not begun to descend the decline of his premature old age. These are the golden years of Indian soldiering.

(35) But, as he advances beyond the seventh year again all is changed. He begins to decay of Indian disease properly so called. He falls a victim to heat apoplexy, liver disease, and the ague

fevers. And if he is badly attacked he dies, or recovers to be a wholly broken-down invalid. Intemperance and climate are ravaging his constitution, and the man soon disappears. Common sense and all observations tend to show, then, that a private soldier in the ranks after seven years in India is in a bad way, and we had best be rid of him. Enthusiasm in his profession must be dead after the monotony of seven years' soldiering as a private. If we wish to keep him, we must let him marry, and at once he becomes an encumbrance and a weakness. What, then, are we to do with the private soldier?

(36) Everything seems to point to this. Keep him not more than five years in India. If he be still a private, send him home to the Reserve, and get a young man in his place. Officers and serjeants are differently placed. The officer in India enjoys a most liberal leave code. Change to Europe, to the English depot, leave to the hills, all combine, with his temperate guarded life, to make him suffer less from India than the private sentinel who does his guard duty for seven or eight years. To be a serjeant is a guarantee that the man has some superior attainments over his comrades in the ranks, and it is also a proof of more careful life and less exposure on sentry duty. Consequently, these two classes escape far more than the private soldier the deterioration of Indian climate exposure. When the private soldier of over seven years' service is invalided, he goes home to England often so broken down by tropical exposure, combined with his own want of care in personal health, that he is a drag upon the country while he lives. Too weak for any laborious trade, he strives to eke out a living by some light duties that always mean light pay as well, To prevent such occurrences, it were far better in an imperial sense to snatch the private soldier away from the likelihood of contracting severe Indian disease to which, as all statistics prove, he becomes liable in an extraordinary degree after his seventh year. Thus medical and Imperial theories will be wholly in accord in this idea. The man's health will be preserved, and England will be saved the loss she sustains in having to pension an utterly broken-down invalid.

(37) If it be true, as Trochu says it is, that the fully trained recruit is the beau-ideal of the soldier, the military aspect of the case will also be favourable. We shall escape in our barrack-room the existence of the unambitious old soldier who may do incalculable injury to the zeal and enthusiasm of the young soldier of the future.

(38) There is one aspect of this medical portion of the question that must be considered. It is unfortunately true that young soldiers, during their first two years in India, die in too great a proportion. They die of a heat typhoid during the hot weather. Dr. Bryden points out how terribly fatal is this fever to the young men, it being almost the sole disease of which they die. The question arises, is this death-rate unavoidable? Is there no way of escaping from such a blood tax? Are we to go on year by year losing so many youngsters, as we do from this fever? It is a great comfort to know that there is an easy refuge from, at any rate, a vast amount of this heat fever. Our system, nowadays, with our long service soldiers is to move up an entire regiment *en masse* to the hills once during its twelve years' Indian service, and let it remain there two years. We have, in addition to these regimental hill stations, a series of convalescent depots along the Himalayan chains to which the breaking-down old soldiers are sent for change of air for a season, and into which we send likewise as many young lads from the different battalions in the plains as can be accommodated, when the sickly men are provided for. The question of keeping the young recruits out of the plains is considered to be secondary in importance to giving the sickly old soldier a place for convalescence, and the lads accordingly occupy only such spare space as may remain available.

(39) Immense advantages follow even this attempt at hill locations for the youngsters. They do not in the hills die of the typhoid fever. They escape the fierce heat that predisposes to it, and in a fine climate they grow up into strong, healthy soldiers. Now this attempt at protecting them is most excellent, and plainly points out the path in which we are to advance in adopting short service system to India. Foremost amongst the changes necessary by such a system will be the abolition of removing a battalion *en masse* to the hills. It will no longer be necessary. It is certainly not essential for the officers' health, as they can get ample leave, and may every third year be told off for special duty in the hill depots quite apart from their regiments. The serjeants, and a few long service men of the battalions of the future, can also go up individually for duty at the hill depots, but the battalion as such will remain always in the plains. Why? Because if we are to have every year crowds of young lads coming out under short service rules to India, it will be necessary to move them *en masse* to the hills. The present regimental hill stations will have to be abolished as such, and turned into hill depots for the accumulated

drafts of each year. In these hill climates the young recruit would have to spend certainly his first year, and in special cases his second year, in the cool climate. In the hills he would go through his first and perhaps his second season, and thus be carried safely through the dangerous period of his Indian service, for practically it is during these first years the young men succumb. There would be no occasion to keep the lads the whole year in the hills. The Indian cold season in the plains is excellent in every way for them. But once the weather began to get warm they should move up to the mountains. In those hill depots schools for training, discipline, and education would exist, and in a climate as good as that of England in summer time, every physical and mental training could be carried out. In the hills the young men would learn of India, and what steps are necessary to guard against its dangers from a climate point of view.

(40) Such a system would in a battalion of 800 bayonets have about 150 to 200 men in the hills each year, and the strength of the army in the plains would be diminished by such an amount. But practically the young men would be quite as available there for any war duty as the present battalions quartered in the hills are. Even in case of insurrection they would hold the hill territories and do for garrisoning these depots, to which it is certain in any future outbreak that the women and children of the European population would retire.

(41) We gain in the plains the headquarters of the regiments now stationed in the hills, but we would lose the recruits and drafts stationed under the system we propose in the hills. Every man in the plains would be thoroughly efficient, there would be very few married men, there would be no shiploads of broken-down invalids returning to England. Surely these are advantages worth gaining.

Conclusion.

(42) From what we have said on the question in the foregoing paragraphs, it will be seen that there is a subject for inquiry and discussion. However much our idea may be in favour of the systems under which we grew up in the Army, it is necessary to foresee the future and meet the altered state of modern opinion. We cannot in England compel the citizen to join the marching battalions, we must induce him to come. This can be done now as it always has been done for years past. If he will not come for the attraction offered him let us find out what will attract him, and

he will come. Long service systems in every European army have passed away. England is now following in the same lead. We must face the question how to maintain our Indian garrison by such a system. In the paragraphs that we have written we have endeavoured to show that short service is not so wholly impracticable an idea as some think it, and that at any rate there are some points in its favour.

Fyzabad, Oudh,
January, 1876.

Reviews.

British Red Cross Society, Hygiene and Sanitation Manual. No. 4. By Lieutenant-Colonel S. Guise Moores, R.A.M.C. London: Cassell and Co. 1914. Pp. 183. Price 1s. net.

It is now customary for each medical organization to have its own manual of sanitation, and such is the *raison d'etre* of the present publication, which contains within a small compass much information that is very necessary for the members of the British Red Cross Society. The importance of instilling a knowledge of sanitation in all who are likely to take any part in war cannot be over estimated, and therefore the appearance of this manual among the text-books of this Society is welcome and necessary. We are inclined to think, however, that more care might have been exercised in the arrangement of the subject matter, and some portions culled from old text-books and manuals might have been brought more up to date.

The first chapter on the prevention of disease deals mostly with the causes of disease, preventive measures being very briefly described. The chapters on food and personal hygiene are clearly and simply written; that on household sanitation, however, contains too many details of building construction. It is unlikely that voluntary aid detachments will be concerned in the construction of houses and the laying of drains.

The manual is illustrated by means of five coloured plates—one black-and-white plate and seventy-three diagrams in the text. It is unfortunate that some of the diagrams do not correspond to the descriptions in the text.

In spite, however, of these small defects, the book is well worthy of attention by all who may be concerned in the care of troops in war.

H. B. F.

Guiding Principles in the Construction of Hospitals (Grundsätze für den Bau von Krankenhäusern). By Obergeneralarzt Dr. Thel. Second Edition. 170 pp., 8vo. Plans 84, Appendices 4. Price 3s. 7d. Berlin: August Hirschwald. 1914.

A second edition of Obergeneralarzt Dr. Thel's book on hospital construction appeared in 1914 as the result of various changes in modern ideas on this important subject.

Large wards in pavilions are making way for rooms with single beds, or wards with a few beds, and new laws in Prussia concerning hospital construction came into force in 1911. The book deals in a practical way with all the points requiring consideration in planning a hospital, from the basement to the roof, how and where annexes, &c., should be built, and with all modern sanitary questions.

There are some interesting pages on the cost of construction of modern hospitals. The writer gives tables showing the date of construction of various well-known hospitals, and the cost of building per bed. In spite of the greatly increased demands of modern times for expensive items like operation rooms, Röntgen rooms, isolation rooms, disinfectors, baths, dining and other rooms for the personnel and many other offices, the average cost of German military hospitals in the last few years works out at about £300 per bed for the larger ones and at about £350 for the smaller ones.

The text is illustrated by plans of different hospitals or portions of buildings, and in the appendices there is an interesting collection of plans of several modern hospitals, the construction of which is based on the latest teachings which the writer has collected into this interesting volume.

For any medical officer with a knowledge of German, this volume would be a valuable reference book when considering alterations or improvements to the hospital of which he is in charge.

This book constitutes the twentieth volume of the Library Coler von Schjering. J. V. F.

Current Literature.

Incinerable Spittoons.—Méd. Principal Arnould contributed an article to the *Archives de Médecine et Pharmacie militaires* for May, 1914, entitled, "Les Crachoirs incinérables." In it he dwells, to begin with, on the desirability of training the public not to spit, but thinks that until that high standard is obtained spittoons must be suitably placed for those who do not respond to the education.

While great progress has been made in combating tubercle, the spit cup has been somewhat neglected, and no great improvements in the pattern have been effected in recent years. The power of disinfectants has been proved very unsatisfactory, and the destruction of sputa in specially constructed costly apparatus is alone effective.

As regards the cleaning of spittoons, the duty is repugnant and apt to be neglected. The regulation spittoons in French barracks, made of wood and lined with zinc, are never properly cleaned. Things are not much better in many hospitals; the earthenware spittoons in use in military hospitals do not stand disinfection by heat and are far from being satisfactory.

In the writer's opinion spittoons which can be burnt are the best; they save all the trouble of cleaning and the sputum is burnt at the same time. This method was first recommended by Schrötter in Germany,

Weismayr in Austria, and by Möjen of Christiania. They were first used in several sanatoria, notably in the United States of America.

Flügge, ten years ago, maintained that it was not necessary to have fluid in the bottom of the spit cup, and suggested some absorbent substance sufficiently dry to be combustible. Against this it was held that infective sputa would be liable to be disseminated in the air with the dry particles of the substance used. Nötel, at the instigation of Flügge, made experiments with regard to this, using sawdust as the absorbing medium, and in no cases had the particles of sawdust which were blown out been moistened by sputa. It took five to six days for moistened particles to become perfectly dry again. . Brouardel, in 1906, introduced an incinerable spittoon which was tried in various hospitals. It underwent several improvements and is now known as the *crachoir Lutèce*. It is cylindrical in shape and made of cardboard in two sizes, for single individuals and for common use. In the bottom there is a layer of powdered peat, which was originally recommended by Weismayr. The cardboard spittoon fits into a simple metal box with a jointed lid, also of metal, which is opened by the hand and closes of itself by means of its weight. The small one is placed on the bedside table, and the large one is fixed to the wall in suitable places about four feet from the ground.

On the whole they have been well reported on ; the big ones are sufficiently high to prevent expectorations missing the receptacle and the lid keeps the flies out. A layer of peat one to two centimetres deep is sufficient, and a small addition of peat is made from time to time dependent on the extent to which the spittoon is made use of. If this is done the small receptacle may be used from two to ten days and the large one up to one month with safety. The attendant whose duty it is to add the peat gives the lid and case a wipe with a moist cloth which is subsequently burnt.

When the cardboard spittoon has answered its purpose it is removed by means of a forceps, placed in a basket or box and burnt in a strong fire (not in the kitchen fire, of course). There is thus no emptying, no cleaning, and the sputum is destroyed by fire.

Some complaints have been offered that they do not burn readily enough, but in these cases it is simply because enough peat has not been used. A more serious objection is that the sputum will not be available for clinical examination or diagnostic purposes. The writer, however, suggests that in cases where the sputum is wanted for examination the best thing to do would be to give the patient the cardboard receptacle without peat or with a layer of cotton-wool. This is better than having two kinds of spittoon.

The chief objection to their general introduction would appear to be a financial one. It is estimated that the initial cost would be eighty-five francs to instal ten large spittoons in barrack rooms of each company, and the annual upkeep would be forty-five francs (cardboard receptacles and peat). An economy might be effected if coffee-grounds were used instead of peat. Flügge has recommended this for a long time. Coffee grounds, however, do not burn so readily and saltpetre might have to be added.

Several companies in regiments in Paris have used these spittoons with great success. They have been in use in many French military hospitals since 1907.

J. V. F.

Free Malarial Parasites and the Effect of the Migration of the Parasites of Tertian Malarial Infections (M. R. Lawson, M.D., *Journ. Exp. Med.*, June 1, 1914).—The author in a previous paper states her belief that the malarial parasite is extracellular throughout its life cycle; that it destroys corpuscle after corpuscle migrating from the used up ones to the healthy; that, as a rule, the parasites are attached to the surface of red cells, but may for brief periods be free in the plasma.

In the present paper the author brings forward evidence to show that many of the so-called flagellating bodies seen in fresh blood specimens are not parasites in the sexual phase, but are parasites which are destroying the corpuscle to which they were attached, and becoming free proceed to throw out protoplasmic processes for the purpose of capturing and reattaching themselves to other red corpuscles.

These pseudopodia are formed from the cytoplasm of the parasite and contain no chromatin.

Blood counts were made at intervals during an attack of malaria, and it was found that the greatest fall in the red corpuscle counts occurred, not, as one would expect, immediately after the segmentation period, but from six to seven hours later; the segmentation period was judged from stained preparations.

This fall is believed to be due, therefore, not only to the loss of red cells at the breaking up of the segmenting parasites, but to the destruction of red cells by the new group of parasites.

Numerous excellent plates are given showing the parasites attached to the external surface of the red cells and also free in the plasma, and a coloured plate contrasting the flagellating sexual parasites with the parasites provided with attacking pseudopodia. D. H.

The Morphological and Developmental Anomalies of a Pathogenic Strain of Trypanosoma Lewisi and their Relation to its Virulence.—Dr. Wade H. Brown, in the *Journ. Exp. Med.*, June 1, 1914, describes two types of a longitudinal division; in one the blepharoplast divided first, then the nucleus, and finally the flagellum in the other, and this is very clearly shown in photos, the flagellum first completely divided up to the micro-nucleus, then the undulating membrane, nucleus, and lastly, the blepharoplast. Several examples of multiple longitudinal division of adult trypanosomes were seen. Closely associated with these developmental anomalies an atypical morphology of the trypanosomes was observed. Extremely small trypanosomes, measuring no more than 7 or 8μ in length, were numerous in some severe infections.

Note.—Similar small forms of *T. Lewisi* were observed by the Royal Society Commission in the strain in the wild rats of Nyasaland, or rather in white rats infected from wild rats.

Posterior elongated forms were very numerous in this virulent strain, some with delicately pointed tip and some with a bulbous extremity. Striations suggestive of myonemes were observed in a few of these forms. Absence of the blepharoplast in otherwise normal forms was observed in this strain, and special attention is directed to this phenomena. These ablepharoplastic forms were not observed in any other strain of *T. Lewisi.*

In conclusion, although it was certain that an intimate relation existed

between the developmental tendencies and the morphology of those strains of *T. Lewisi*, it could not be definitely determined to what degree these characteristics were co-ordinated with the virulence. D. H.

Note.—Anuclear forms of *T. Brucei* were observed by the Royal Society Commission in Nyasaland and have been figured in their reports; these anuclear forms were otherwise apparently normal.

The Recognition of the Cholera Vibrio (C. V. Craster, M.D., *Journal of Experimental Medicine*, June, 1914).—Saprophytic cholera-like vibrios have been found in healthy persons from infected localities and in those suffering from diseases other than cholera, and in the waters of rivers and wells of cholera infected districts. These cholera-like organisms may closely approximate to true cholera in their morphology and cultural appearance, but give negative reactions with specific sera. So far as we know these cholera-like vibrios are non-pathogenic for man and are certainly of low virulence for laboratory animals.

Of all pathogenic organisms the cholera vibrio is the most susceptible to the action of serum antibodies, positive agglutination taking place in extreme dilutions of the serum 1 in 10,000 and 1 in 40,000.

Bacteriolysis may also be observed *in vitro* by Bordet's method, in high dilutions, or *in vivo* by Pfeiffer's method.

Zlatogoroff, while studying the properties of eighteen strains of cholera-like vibrios (non-agglutinating), isolated from the water of rivers and wells during a cholera epidemic in Saratow in 1908, noted, after a month's culture on ordinary laboratory medium, a spontaneous development of agglutination with anti-cholera sera on the part of several of the vibrios. By (1) daily cultivation on fresh agar with alternate incubation at 37° C. and cool storage at 16° to 18° C., and (2) weekly passage through the peritoneal cavity of guinea-pigs, he was able at the end of the fifty-fourth generation to produce agglutinating properties in ten out of the eighteen strains in dilutions of 1 in 10,000 to 1 in 20,000. The complement fixation test of Bordet confirmed the above results.

Zlatogoroff also allowed a suspension of the cholera vibrio to remain in distilled water for seven days; after this treatment the agglutinating titre fell from 1 in 5,000 to 1 in 1,000. Further treatment on these lines reduced the agglutination titre as low as 1 in 300.

Craster repeated this work on somewhat similar lines. His non-agglutinating strains were obtained from rectal swab cultures from healthy persons during a cholera epidemic. The cultural properties of the fourteen strains employed differ but little. The Pfeiffer reaction was negative in all. After several months' growth on laboratory medium three of the cultures were agglutinated by anti-cholera serum in a dilution of 1 in 1,000. The virulence of these strains was so low that it was found necessary to ensure passage, and inject at the same time a dose of dead typhoid bacilli. After serial passage through five guinea-pigs and daily cultivation on fresh agar for seventy generations considerable increase in the agglutinating power was observed to have taken place. The Pfeiffer reaction was however still negative in all the strains. Positive bacteriolysis was shown by Bordet's method in four of the fourteen strains.

To sum up, although it cannot as yet be definitely proven, we are justified in suspecting that cholera-like vibrios which eventually develop agglutination properties are of a true cholera nature. In all probability

among a number of cholera-like vibrios isolated from suspected sources a certain percentage will eventually be found to develop agglutination either during laboratory cultivation or by means of animal passage, and until subjected to a procedure that will induce the return of agglutination no vibrio can be regarded with assurance as of a truly saprophytic variety. D. H.

Note on a Case of Osteoperiostitis developing after a probable Attack of "Febris columbensis" (Aldo Castellani, *Journal of Tropical Medicine and Hygiene*, June 15, 1914).—A bacillus was isolated from pus obtained from sinuses in the left arm of a patient, a Cingalese; this bacillus agreed in its sugar reactions with the *Bacillus columbensis* (Castellani, 1905). The *B. columbensis* gives the sugar reactions of *B. paratyphosus* B, except that it has a variable action on lactose; sometimes it does not ferment lactose, and occasionally it produces slight acid and gas in this carbohydrate. However, the bacillus is not agglutinated by either typhoid or paratyphoid serum; nor does it remove the agglutinins by absorption from such sera.

Castellani has already isolated a similar bacillus from five cases of fever, clinically remembering typhoid.

The present patient gave a history of an attack of continuous fever, which lasted six weeks, and abscesses developed over a year later. This man's serum agglutinated the *B. columbensis*, but not typhoid or paratyphoid A or B. D. H.

A Flying Machine for the Medical Service.—*Le Caducée*, for June 6, 1914, reports that Mlle M. Marvingt, who is a certificated lady aviator, and also a nurse in the Voluntary Aid Society, known as the Société de Secours aux Blessés militaires, has undertaken by raising subscriptions to supply the medical service with a flying machine to be used in searching the battlefield for wounded. It is to be called "L'avion-ambulance 'Capitaine Echeman,'" after one of the many victims of aviation disasters. Over 22,000 francs have already been collected.

It is generally held that flying machines will be of great service in discovering places where wounded have collected; the observing officer would make marks on a map to show where these places are, and this would be of great use to the bearer companies. J. V. F.

On the New Portable Bacteriological Laboratory of the Austrian Red Cross Society.—This laboratory, introduced in 1914, is carried on pack animals and has been devised by Stabsarzt Professor Dr. R. Doerr, and Dr. Josef Winter.

Twelve sets, altogether forty-eight boxes, have been acquired. The outfit is the outcome of an endeavour to cope with outbreaks of infectious diseases occurring amongst the troops of the Dual Monarchy.

Although larger portable laboratories belonging to the Salubritäts Kommission and the K.k. Landwehr already exist, it was considered advisable to acquire others which would be more readily transportable and capable of being used in mountainous country.

Considerable care has been taken in the packing to make each chest as complete as possible, so that one may be available to be sent off

for a special examination of an outbreak of a particular disease like cholera.

Each laboratory consists of four chests, each of which bears the number of the laboratory and the nature of the contents. Each chest measures 65 cm. in length, 40 cm. in breadth, and 35 cm. in height. Each chest will not exceed 45 kg. in weight. A and B, C and D balance each other. They are made of pitch pine with strengthening metal patches at the corners, and are supplied with the necessary hooks and chains for use on pack saddlery. The interior is lined with felt to prevent breakage of the contents. This new pattern contains 64 Petri-dishes, numerous glass flasks, pipettes, 200 agglutination tubes, a sterilizer for instruments, an instrument case for operations on animals, a large copper disinfecting bath, numerous sera and stains, typhoid bile tubes, &c. A thermostat, a most important bacteriological apparatus, occupies a good deal of space in the outfit.

There is a model microscope which packs into a leather case and can be carried on a strap over the shoulder.

Chest D contains two little cupboards with numbered boxes. These cupboards can be placed on a stand or hung on a wall. They contain various small articles, instruments, staining reagents, culture media, cover-glasses, slides, &c., which thus allows of tidy working.

In the event of one medical man being detached during war to investigate an outbreak of one particular disease in a given area, Chest C contains a knapsack with an apparatus for making a normal salt infusion, several receptacles for infected material (stools, blood, &c.), serum syringe, various drugs, some tincture of iodine, dressings and leucoplast. This knapsack and the microscope will probably enable the investigating officer to make a diagnosis on the spot or at any rate to bring back with him to the laboratory all that is required for further investigation. He will also be in a position, in the event of a cholera outbreak, to cope with the disease.

The outfits on each of the two pack animals are independent of each other. Boxes C and D contain all that is necessary for microscopic and sero-diagnostic investigations and for preparing saline infusions, and would accompany the investigating medical officer in the first place. The other pack would only be taken if it was anticipated that the investigation would extend over twenty-four hours, when the use of bacterial cultures would be indicated.

The contents of the individual chests are as follows:—

Chest A.

Left at Back.—One thermostat made of aluminium, double walls, with three perforated partitions. Inside measurements, 34 by 24 by 22 cm. In addition a heating chamber for the thermostat, inside which the chimney is packed. Inside the thermostat: (1) a small tin box, containing the heating lamp (this can be used for lighting purposes as well); (2) tin box, containing folding stand for cooking pots; (3) tin box, containing 3 lamp chimneys; (4) two sterilizers made of aluminium, each containing 8 Petri dishes (9 cm. diameter).

Left in Front.—A box with 4 folding stands for culture tubes, 4 folding stands for agglutination tubes, the 4 feet of the thermostat, 1 graduated éprouvette to 25 c.c., 1 graduated measure glass to 100 c.c.

On the Right Side.—Three drawers with 6 aluminium sterilizing boxes, each with 8 Petri dishes.

CHEST B.

Left Drawer. — One metal hot air sterilizer, double walled, with perforated inner tube, copper bottom, with handles on both at the sides. Inside the hot air sterilizer, 1 tin box containing 2 petroleum burners with accessories, 2 large gas burners, 2 small gas burners, 2 spirit lamps. Two aluminium sterilizing boxes containing 2 linen bands with 12 measuring pipettes to 1 c.c., graduated to ·01 c.c., 1 linen band with 12 measuring pipettes to 5 c.c., graduated to ·1 c.c. The 4 feet for the hot air sterilizer, 1 thermometer to 200° C.

Middle Drawer. — One wooden case containing 8 Erlenmeyer flasks to 100 c.c., 3 Erlenmeyer flasks to 500 cc., 1 sack with rubber stoppers for above and perforated cork stoppers for the thermostat, hot air sterilizers and steam sterilizer.

Right Drawer. — A steam sterilizer (to be used also for sterilizing instruments) made of nickelled brass. The lower part of the sterilizer has an inner tray (Einsatz) containing two aluminium sterilizing boxes, in each of which is packed a band with 12 measuring pipettes to 1 c.c., graduated to ·01 c.c. In the water chamber of the instrument sterilizer (Wasserverschlussrinne) is the steam sterilizer, both with side chains and hooks to fasten them together. The bottom of the steam sterilizer has a removable sieve plate on which are placed two rectangular cooking pots made out of nickelled brass with lids. Each contains two aluminium tin baskets, each packed with a linen band holding 40 culture eprouvettes and a linen band with 50 agglutination tubes. Also the 4 feet for the steam sterilizer and a thermometer to 100° C.

CHEST C.

The entire space of this chest is filled with a copper bath coated with tin inside and out. Into this is packed :—

(1) A zinc tin with 8 compartments : the 4 on the right are of equal size and contain : 1 canister for 2 litres formalin, 1 canister for 2 litres petroleum, 2 metal tubes each containing 2 kg. pot. hy.-permang. The other compartments contain : (*a*) 1 nickelled brass box with 2 complete saline infusion apparatus ; (*b*) 12 receptacles for carrying stool specimens and 3 outfits for carrying blood ; (*c*) the microscope in leather case with sling ; (*d*) a tin box containing : 1 working cloak, 1 pair of rubber gloves, 2 towels, 1 nickelled brass box containing a piece of soap and a nail-brush.

(2) A leather case or knapsack with handle and shoulder-straps, containing : 1 syringe 10 c.c. (Rekordspritze) ; 2 needles for the saline infusion apparatus ; 1 clinical thermometer ; the saline infusion apparatus in several pieces ; coloured pencils ; 50 slides and coverslips ; 1 packet of wool ; 1 roll of leucoplast ; 1 stand for agglutination tubes ; 1 pump for the saline infusion apparatus ; 1 bottle of NaCl tabloids ; 1 bottle of ether in a metal case ; 1 band with 20 agglutination tubes ; 9 wooden cases for bottles, containing : (*a*) tincture of iodine, (*b*) curative sera, 2 appliances for transporting stool specimens, 2 for blood, each with 4 tubes.

(3) Along the inner wall of the copper bath 2 asbestos plates with tin let in.

(4) On the floor of the bath 10 sheets of filter paper.

(5) A linen folio containing a diary, letter paper and 2 ink pens.

CHEST D.

This contains two wooden cupboards packed with boxes with compartments, and all numbered. The upper cupboard has 8 boxes.

(No. 1) 2 forceps; 2 cover-glass forceps; 2 prickers; 1 box with 2 platinum needles and loops; 4 Kolle needle holders; red and blue pencils; 6 scratching needles (Zupfnadel).

(No. 2) 1 syringe (Rekordspritze) to 20 c.c.; 2 syringes (Rekordspritze) to 10 c.c.; 1 syringe (Rekordspritze) to 2 c.c.

(No. 3) 9 metal cases containing: 2 bottles each 20 c.c. Giemsa solution; 2 bottles each 20 c.c. concentrated fuchsin solution; 1 bottle with 30 grm. carbolic acid; 1 bottle with 20 grm. aniline oil; 1 bottle with 20 grm. lugol solution; 1 bottle with 20 grm. cedar wood oil; 1 bottle with 20 grm. Canada balsam.

(No. 4) Three compartments: (*a*) 12 tubes soloid fuchsin; 6 tubes soloid gentian-violet; 4 tubes soloid Leishman. (*b*) 5 phials to 2 grm. pure iodine; 2 phials to 2 grm. KI. (*c*) 2 phials to 1 grm. kitchen salt; 2 phials to 2 grm. peptone Witte; 2 files for ampoules; 12 metal cases containing: 4 bottles to 40 c.c. absolute alcohol; 2 bottles to 40 c.c. ether; 2 bottles to 50 c.c. xylol; 2 bottles to 50 c.c. methyl alcohol.

(No. 5) Dissecting instruments: gut scissors; 2 p.m. needles; 1 straight scissors; 1 bent scissors; 1 brain knife; 4 scalpels, various; 3 forceps; 4 potato knives.

(No. 6) Instruments for animal operations: 1 small surgical scissors; 1 blunt-pointed scissors; 1 bone scissors; 2 scalpels; 2 forceps; 2 hook forceps.

(No. 7) With 4 compartments, each containing: 3 deep watch glasses (6 cm.) in a linen cover and a tube of sublimate tabloids.

(No. 8) 10 typhoid bile tubes; various sera in ampullæ; 10 bottles to 25 c.c. of various agglutinating sera. The lower cupboard contains 7 boxes.

(No. 9) 1,000 cover glasses; 500 glass slides; 200 hollow slides.

(No. 10) General utility tools (Universalwerkzeug); 3 brushes, various; 1 stick of sealing wax and a skein of thread.

(No. 11) 1 bundle glass rods; 1 bundle glass tubes; 1 glass file.

(No. 12) 12 packets of wool to 25 grm.

(No. 13) 1 weighing machine; 1 packet of round filters made of paper.

(No. 14) 2 aluminium funnels; Doorr's dried culture media; 61 culture agar; 61 Drigalski agar; 41 Dieudonné agar.

(No. 15) 1 hand centrifuge; 1 case with a band containing 10 centrifugal cases; 1 case with 2 cloths; 1 case with filter paper. Between the two cupboards 20 sheets of filter paper.

J. V. F.

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C.N. = Clinical and other Notes.
C.L. = Current Literature.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

JULY, 1914.

ARMY MEDICAL SERVICE.

Surgeon-General Sir William L. Gubbins, K.C.B., M.V.O., M.B., is placed on retired pay, dated June 1, 1914.

Surgeon-General Sir Arthur T. Sloggett, *Knt.*, C.B., C.M.G., Honorary Surgeon to The King, to be Director-General, and to rank as Lieutenant-General, *vice* Surgeon-General Sir W. L. Gubbins, K.C.B., M.V.O., M.B., dated June 1, 1914.

Surgeon-General William Babtie, V.C., C.B., C.M.G., M.B., is appointed an Honorary Surgeon to The King, *vice* Surgeon-General Sir W. L. Gubbins, K.C.B., M.V.O., M.B., dated June 1, 1914.

Colonel Richard W. Ford, D.S.O., to be Surgeon-General, *vice* Sir W. L. Gubbins, K.C.B., M.V.O., M.B., retired, dated June 1, 1914.

Colonel Tom P. Woodhouse, from the half-pay list, to be Colonel, *vice* R. W. Ford, D.S.O., promoted, dated June 1, 1914.

ROYAL ARMY MEDICAL CORPS.

Major Robert B. Black, M.B., retires on retired pay, dated May 27, 1914.

The undermentioned Captains to be Majors, dated June 1, 1914:—

Percival Davidson, D.S.O., M.B., John Mackenzie, M.B., Norman D. Walker, M.B., Arthur H. Hayes, Henry J. Crossley, Reginald Storrs, Raymond L. V. Foster, M.B., Frederick A. H. Clarke, George A. K. H. Reed, John M. H. Conway, Sydney M. W. Meadows, William W. Browne, William D. C. Kelly, M.B., Norman E. J. Harding, M.B.

Supernumerary Captain Douglas P. Watson, from the seconded list, is restored to the establishment, dated June 6, 1914.

Captain George A. D. Harvey is seconded for service with the Egyptian Army, dated June 4, 1914.

Captain Albert E. F. Hastings is removed from the service, dated May 1, 1914.

Quartermaster and Honorary Captain Edwin Houghton is placed on retired pay, dated June 17, 1914.

Serjeant-Major Ernest William John Escott to be Quartermaster, with the honorary rank of Lieutenant, dated June 17, 1914.

ARRIVALS HOME FOR DUTY.—From West Africa: on May 21, Captain C. J. Wyatt. From India: on June 13, Lieutenant-Colonel F. W. C. Jones.

ARRIVALS HOME ON LEAVE.—Lieutenant-Colonels W. L. Gray, F. W. Hardy, and J. E. Brogden; Majors R. C. Lewis, A. H. Morris, C. R. Evans, A. M. MacLaughlin, and H. A. Bransbury; Captains J. B. Hanafin, W. R. O'Farrell, J. W. Houston, T. J. Mitchell, A. D. Stirling, R. C. Paris, H. R. Edwards, L. C. Hayes, and C. M. Nicol.

POSTINGS.—Scottish Command: Captain J. Fairbairn. Aldershot Command: Captain W. W. Boyce. Irish Command: Captains D. P. Watson and R. F. O'T. Dickinson. Southern Command: Lieutenant-Colonel F. W. C. Jones, Captain F. T. Turner.

Quartermaster and Honorary Lieutenant E. W. J. Escott has been posted to the Royal Victoria Hospital, Netley, for duty.

TRANSFER.—To York: Surgeon-General R. W. Ford, D.S.O., from Aldershot.

TRANSFER TO THE HOME ESTABLISHMENT.—From India: On June 30, Captain R. F. O'T. Dickinson.

APPOINTMENTS.—Surgeon-General R. W. Ford, D.S.O., Deputy Director of Medical Services, Northern Command. Colonel T. P. Woodhouse, Deputy Director of Medical Services, Aldershot Command. Lieutenant-Colonel F. W. C. Jones, Assistant Director of Medical Services, Southern Command. Major B. B. Burke, Medical Charge of the Duke of York's Royal Military School. Captain D. P. Watson, Clinical Pathologist, Curragh.

QUALIFICATIONS.—The undermentioned officers have obtained the degrees, etc., noted against their names: Surgeon-General Sir A. Keogh, K.C.B., retired, the Fellowship of the Royal College of Physicians, London; Brevet-Colonel Sir W. B. Leishman, *Knt.*, F.R.S., K.H.P., the Fellowship of the Royal College of Physicians, London, and the following degrees, (*honoris causa*) LL.D., University of Glasgow, LL.D., MacGill University, Montreal; Major H. V. Prynne, the Fellowship of the Royal College of Surgeons, England; Major J. M. H. Conway, the Diploma in Public Health of the University of Cambridge; Captain J. A. Anderson, the Diploma in Public Health of the Royal Colleges of Physicians and Surgeons, Edinburgh, and Royal Faculty of Physicians and Surgeons, Glasgow.

ROSTER FOR SERVICE ABROAD.—Majors R. W. Clements, G. M. Goldsmith, J. G. Gill, and A. H. Safford, Captains H. E. Priestley and G. H. Stack have exchanged to higher positions on the Roster with Majors S. H. Fairrie, R. B. Ainsworth, F. McLennan, and E. B. Knox, Captains H. B. Kelly and H. Harding, respectively.

EMBARKATIONS.—For Egypt: on June 19, Lieutenant A. F. C. Martyn. For West Africa: on June 20, Major J. C. B. Statham.

WARRANT OFFICERS, NON-COMMISSIONED OFFICERS, AND MEN.

THE FOLLOWING N.C.Os. AND MEN HAVE PASSED THE NECESSARY CORPS EXAMINATIONS FOR PROMOTION.

		FOR QUARTERMASTER-SERJEANT.			
10900	Staff-Serjt.	Andrews, A. C.			
		FOR SERJEANT.			
18524	Corporal ..	Smitherman, T. H.	18545	Corporal ..	Douglas, J.
19536	,,	Reece, W. E.			
		FOR CORPORAL.			
1990	Private ..	Parker, J. W.	4488	Private ..	Pretious, A. P.
1855	,,	Crowe, F. J. A.	4562	,, ..	Wood, F. C.
6071	,,	Rawlings, G. H.			

DISCHARGES.

9405	Staff-Serjt.	Valance, C.	2.6.14	After 3 months' notice.
10074	,, ..	Wilkins, H. ..	4.6.14	Termination of second period.
11064	Corporal ..	Slattery, F. ..	23.5.14	After 18 years.
18316	Private ..	Stilling, W. A. ..	22 5.14	After 3 months' notice.
7796	,, ..	Silverwood, J. ..	25.5.14	Payment of £10.
6644	,, ..	Davidson, J. ..	29.5.14	No longer physically fit, etc.
6980	,, ..	Hall, J.	4.6.14	,, ,, ,,
7788	,, ..	Dobie, D.	2.6.14	Payment of £10.
7671	,, ..	Aldridge, R. E. ..	5.6.14	,, ,,

APPOINTED BUGLER.

7332	Boy ..	Campbell, F. J. ..	3.6.14	*Vice* Parkinson to the ranks.

TRANSFERS FROM OTHER CORPS.

11816	Staff-Serjt.	Shepherd, L. A. ..	14.5.14	From 2nd H.F.A. R.A.M.C.(T.F.)
7798	Private ..	Dreselman, A. ..	1.5.14	,, 1st Bn. Welch Regt.

TRANSFERS TO ARMY RESERVE.

5493	Pte.	Montague, H. ..	12.5.14	5694	Pte.	Maughan, R. ..	28.5.14
5494	,,	Hayes, A. E. ..	15.5.14	5519	,,	Nicolle, W. ..	1.6.14
5503	,,	Banks, W. J. ..	16.5.14	5520	,,	Carpenter, G. H.	1.6.14
5498	,,	Bates, J. J. G...	18.5.14	1111	,,	Worrad, W. P.	5.6.14
5497	,,	Greenhill, J. C.	17.5.14	5523	,,	Day, S. T. ..	5.6.14
5509	,,	White, W. C. H.	21.5.14	1521	,,	Palmer, T. A. ..	6.6.14
5511	,,	Turner, H. W...	22.5.14	5530	,,	Brotherstone, W. M.	9.6.14
5508	,,	Richardson, W.C.	21.5.14				
5506	,,	Wade, T. ..	23.5.14	5535	,,	Masters, C. H...	12.6.14
1527	,,	Way, S. E. ..	26.5.14	5537	,,	Perkins, E. J. ..	12.6.14
5518	,,	Stimpson, A. E.	28.5.14	5539	,,	Clifton, V. G. ..	12.6.14
5513	,,	McConnell, E...	29.5.14				

TRANSFERS TO OTHER CORPS.

17759	Staff-Serjt.	Black, J.	10.6.14	To Colonial Govt., Sierra Leone.
15776	Serjeant ..	Blackman, H. G. ..	20.5.14	,, ,, ,, Uganda.
19478	Corporal ..	Pollett, A.	13.5.14	,, ,, ,, Yaba, Lagos.
7521	Private ..	Rae, G.	10.6.14	,, 118th Batty. R.F.A.

DEATHS.

4876	Private ..	Gell, E. S.	30.5.14	Malta	Drowning.
16402	Staff-Serjt.	Colls, S.	1.6.14	Khartoum	Heat apoplexy.
18233	,, ..	Evans, D. C. ..	4.6.14	Singapore	Syncope.

NOTES FROM THE LONDON DISTRICT.

The R.A.M.C. Mess, London.

On Tuesday, May 26, Colonel Skinner and the officers of the mess entertained the retiring Director-General, Sir Launcelotte Gubbins, K.C.B., M.V.O., K.H.S., etc., to a farewell dinner in the mess. As many officers as the dining-room could accommodate were present, among them being the following: Surgeon-Generals Sir Arthur Sloggett, Sir Alfred Keogh, Whitehead, Macpherson; Colonels Skinner, Lynden Bell, Peterkin; Brevet-Colonels Hickson, Melville, Horrocks, Sir William Leishman; Lieutenant-Colonels James, Nash, Yarr, Burtchaell, Barefoot, Scott, Beveridge, Robinson, Gibbard, Stanistreet, and Pilcher; and Sir Ronald Ross.

After the toast of "The King" had been duly honoured, Sir Arthur Sloggett proposed the health of Sir Launcelotte Gubbins, and said they had gathered together to do honour and say farewell to a great chief.

"Sir W. L. Gubbins entered the service in 1873. He came from that very famous school, Trinity College, Dublin, where his prowess as an all-round athlete was remarkable. At Rugby football and sprinting he was at the top of the tree, and as a boxer I believe many of his fellow students were painfully aware of his ability, and even at the present time I think he could use as straight a left as any veteran, and I think we would all rather drink with him than fight with him.

"He was also renowned as a fearless rider across country, and up to even the present day he is often to be seen following the hounds of any hunt within reach.

"On joining at Netley he was made captain of the Rugby team, and was instrumental in promoting sport generally.

"With only a year's service he was sent to India and was present in the long campaign in Afghanistan, in which he did such good work that the Commander-in-Chief specially brought his services to the notice of the Secretary of State for War. On coming home after six years in India, he had very little rest, for he was shortly afterwards ordered to take part in the Egyptian campaign. In this campaign it was not his fortune to be in the fighting line, but he was sent to Cyprus to assist in the organization of a base general hospital. He afterwards went to Egypt proper with the Field Force, in medical charge of the Cameron Highlanders. After the campaign he spent about two and a half years at home, and was then again sent to India, and had hardly got there when he was in the thick of the arrangements for the Burmese war. His knowledge of the disposal of the sick and wounded led to his being posted to the hospital ship *Tenasserim*, which was organized to receive invalids from Upper Burma. Here again, as in Egypt, he was not lucky enough to get to the front, and owing to the limits of the Army Orders on the subject was not given the medal. He came home again in 1891, and was shortly afterwards appointed Registrar and Secretary of the Royal Herbert Hospital. His duties here brought him into direct contact with, and command of, the W.Os., N.C.Os. and men of the Corps, and the very keen interest he took in their welfare and their efficiency is remembered by the Corps at the present day.

"He displayed such ability in this appointment that the D.G. (Sir Wm. Mackinnon) thought his talents should be used in a higher sphere, and therefore called him to the War Office for the charge of the sub-division dealing with mobilization and organization. While in this appointment he was mainly responsible for transforming and modernizing the medical and surgical equipment of the Army, and we have him to thank for the first issue of the mobilization tables and instructions for the A.M.S. He was in this post when the South African war broke out, and upon his shoulders fell all the arrangements for the mobilization of units and supply of stores and equipment, a stupendous task which he performed with his usual conspicuous ability. He remained at these duties until it was clear that arrangements for the supply of personnel and medical stores would continue to run smoothly, when he was selected to be P.M.O. of the 6th Division, with which he embarked in December, 1899. The Division, as most of you are aware, took part in the march to Pretoria, and Sir Launcelotte was present at the Relief of Kimberley, and at the actions at Paardeberg, Poplar Grove, and Dreifontein.

"In October, 1900, he was made P.M.O. at Pretoria, and it was not until October, 1901, when the strenuous work he had done made inroads on his health, that he was able to come home. He was mentioned in Despatches and specially promoted Colonel. After a short period of sick leave he was again in harness, and as P.M.O. of the London District was responsible for making all the military medical arrangements

connected with the Coronation of his late Majesty King Edward, and so well did he perform them that he was awarded the Membership of the Royal Victorian Order.

"In August, 1903, he was promoted Surgeon-General, and in November of the same year was off to India as P.M.O., Bombay Command; he was afterwards P.M.O., Eastern Command, India, and in May, 1906, became P.M.O. in India. In June, 1908, he was appointed Deputy Director-General. I think it is sufficient evidence of the great faith the highest authorities had in his ability that they decided to retain him on the active list beyond the age limit in order that he might fill the appointment of D.G., to which he succeeded in 1910.

"In 1909 he was made an Honorary Surgeon to His Majesty the King.

"Throughout his whole career Sir Launcelotte has been marked out as a man of ceaseless energy, always vigilant and thorough. While occupying the Director-General's appointment it has been his endeavour always to keep his ship on an even keel.

"His administration has been without fear or favour, and the many officers who have come in contact with him are loud in their praises of his dealings with all ranks, which have been without prejudice to friends or strangers; private influence had no impression on him, and his decisions were given on grounds of merit and on no other consideration.

"Sir Launcelotte's literary abilities are well known to you, but I must mention particularly his knowledge of history and biography. On the many occasions when he has been called upon to give addresses both in this institution and elsewhere, his references to historical events have been most illuminating, and as a speaker he is renowned. We all wish him long life and happiness in the future, and may all good luck follow him and his. I ask you, gentlemen, to drink his health with full musical honours—three times three."

Sir Launcelotte Gubbins, on rising to respond, said: "Sir Arthur Sloggett, Colonel Skinner and gentlemen, in the good old days, as they are at times somewhat erroneously called, it was held to be the special privilege of the political prisoner about to be executed on Tower Hill, or the meaner malefactor destined to be hanged at Tyburn, to make a last speech, either as a protest against his fate, or in justification of the deed for which he was sentenced; similarly on the eve of my official extinction I am glad of this opportunity not only to thank Sir Arthur Sloggett for all the nice things he has said about me, but also to justify any mistakes I may have committed during my term of office.

"And when one talks of orations on the scaffold my mind reverts to an occasion some twenty and odd years ago, when I witnessed a memorable Shakespearean production by the late Sir H. Irving (I allude to Henry VIII); it was remarkable in many ways, and one of the most striking scenes in it was the farewell speech of the Duke of Buckingham as he was about to be led to the block, delivered by that incomparable elocutionist, Mr. Forbes Robertson. We, however, live in a more prosaic age, and in this particular institution in an atmosphere of education, but it is astonishing how indifferent the authorities were up to a comparatively recent period to the necessity of an officer possessing any knowledge at all. Setting aside the scientific corps, down to 1849 there was kept at headquarters what was known as a 'Horse Guards' List,' and any youth with a little interest whose parents were prepared to plank down £450 for a commission was gazetted as vacancies occurred without any test, either physical or educational, whatever. In that year an edict was issued that all future candidates would have to qualify in arithmetic, algebra, history, geography, and a few other elementary subjects; great was the consternation when the new rules were published; half the would-be warriors removed their names at once, and of the remainder, quite 40 per cent were ploughed, chiefly owing to ignorance of geography and to bad spelling. However, the Ordinance of 1849 came to stay; the progress in education has been remarkable, and I venture to say that, from the military point of view, there is no better trained or better informed man in any country than the present day British officer.

"Now when so much is being done to raise the standard in other branches can the Royal Army Medical Corps afford to stand still? Emphatically 'no.' One of the chief reasons for moving the school from Netley to London (to which there was originally great opposition) was to bring the Corps into closer touch with the civil profession, which is all-important for many reasons, and by the institution of a post-graduate training—generally known as a captains' course—to afford these officers an opportunity of obtaining up-to-date knowledge.

"Personally, I look on this nine months' instruction which captains get as *most*

valuable, and although it may be both desirable and possible to improve it as time goes on, I sincerely trust it may never be dispensed with. I am aware that it entails a good deal of hardship on some officers, especially the married ones, but we have all along endeavoured to treat everyone with both justice and sympathy. I have incidentally mentioned 'justice'—what a blessed word it is! La Rochefoucauld, the French moralist who lived in the seventeenth century, who revelled in paradoxes and turned every virtue into ridicule, drew the line at *justice*, declaring it was much too serious to be made the subject of satire; and I would like to take this opportunity of impressing on the younger officers, who are still in a military sense of a receptive age, the desirability of cultivating it at all times. Many of you will rise to high positions in the service; all of you will, at some time or other in your career, have men under you, and as a result of long experience of army life I will say, be as strict as ever you like, but always be just, and you will be respected accordingly.

"And now before I leave this College I would like to say a word about the officers who have contributed so largely to make it the success it is generally acknowledged to be. First comes the Commandant. Everyone knows the energy and zeal he displays in filling what is an extremely difficult and anxious rôle; nor must we forget his second-in-command, who by his tact and sympathy with the junior officers has done so much to oil the machinery of this institution.

"Coming to the Professors, those of Medicine and Pathology have joined the staff too recently to have made their mark, but by all accounts they are on the right track. The Professor of Hygiene it is superfluous to praise. In addition to being an expert in his special subject he is—like two other distinguished men (Pasteur and Ehrlich)—a great chemist and the terror of evil-doers, fraudulent contractors, and people of that sort, as I can well remember in old Pretoria days. Next I will mention the Professor of Surgery, who by his splendid work, both here and in the Queen Alexandra Hospital, has done so much to raise our reputation throughout the Army. The high esteem in which he is held is evidenced by the fact that the officers' wards over the way, although they contain fifteen beds, are always full; besides there is a long waiting list of people clamouring to come in, and I need not enlarge on the boon this is to the British officer who has not too many guineas to spare. Lastly, I must not forget the Lecturer in Dermatology, who presides with such distinction over the military hospital at Rochester Row. Only last autumn Professor Ehrlich called on me to say how profoundly impressed he was with the splendid work of this officer and his colleagues, and how much indebted he was for the very accurate statistics furnished him by our professor.

"Of course you are all aware of the marvellous improvement that has taken place in the health of the Army during the past ten years; this has been most marked in India, where the successful efforts of Sir F. Trevor, Sir A. Sloggett and the officers serving under them remain on permanent record. Nevertheless, although these good results are primarily due to the zeal of the Royal Army Medical Corps officers and the teaching which they obtain at this College, there are two contributory factors we cannot ignore: one is temperance, the other physical training; and the question arises, What should our attitude be towards both these influences? On several occasions I have been approached with a view to issuing a circular letter to our officers to take the cause of temperance specifically under their wing, but I have steadfastly refused to do so; far from doing any good it would, in my opinion, do harm. Strong believer in temperance as I am, its advocacy, I hold, should be common to *all* arms and not confined to any particular branch; at the same time Royal Army Medical Corps officers when lecturing on hygiene and kindred subjects can place before their auditors all the arguments for sobriety as I am sure they do. In connexion with this subject I can recall the farewell order of Lord Napier of Magdala (one of the three great Commanders-in-Chief in India) when he vacated his post in March, 1876. In that order he drew attention, amongst other things, to the fact that the proportion of crime amongst non-abstainers as compared with temperance men was as 40 to 1; this gave one food for reflection.

"The other factor to which I would allude is physical training, in which we have now specialists, and this is one in which we can take an active if not a leading part. Physical training and its concomitant, the various sports that are now so popular, help both officers and men to bear the fatigues and hardships of active service which is, after all, our ultimate goal. I have mentioned the term 'active service' designedly, for we must never lose sight of the fact that although we may get along very well during peace—attracting little public notice—yet it is by *war* we shall be judged; in war, as we know from past history, all eyes—carefully fed by newspaper

correspondents, some friendly, others the reverse—will be focussed on us and our work. Then it is that we live on a mine which may explode at any moment; all we can do, therefore, is to prepare in peace so that when the explosion does come it may be rendered as harmless as possible. Accordingly, as we are at the great disadvantage of having no organized units during peace, we have endeavoured to make up for it by having training camps—at Tidworth, Aldershot, Barry in Scotland, and the Curragh—in addition to medical manœuvres, the latter in conjunction with other arms of the service. It is satisfactory to note that all general officers commanding concerned have entered cordially into the spirit of the business and rendered practical help in every way, realizing that they and their staff have just as much to learn from this class of exercise as we have.

"As regards the training camps, how much the attendance of all ranks has grown may be judged from the fact that last year 193 officers and 4,333 of other ranks, including reservists, passed through a fortnight's training at the four places I have just mentioned. Everybody has been dug out, no matter what appointment he has been holding—the bacteriologists, the pathologists, the sanitarians, all have done their turn; even that exalted functionary the Professor of Hygiene took the field at the grand manœuvres last autumn to familiarize himself with the rôle he would play in the expeditionary force, and it is extremely gratifying to learn from the commanding officers of the camps that the scientific officers I have just mentioned were amongst the keenest and most energetic of those detailed to attend them, whilst all ranks returned to their stations the better for the fourteen days' training. You can well imagine what a delightful change it must be for the nursing orderly who has been cooped up in his wards, it may be for months, or the man of the clerical section engaged in sedentary work, to get into the fresh air for a fortnight and hear the nightingale and the lark.

"Speaking seriously, however, this training for war is all important. In July, 1870—I remember it as if it were only yesterday—when Lord Granville went down to the Foreign Office to take over the duties of the Secretary of State in succession to the Earl of Clarendon, who had recently died, he was told by the permanent officials that they had never known the chancellories of Europe so quiet, that in fact there was not a cloud on the political horizon, yet within ten days France and Germany were engaged in deadly conflict. Less than three years ago, in 1911, we had the Morocco scare which caused us all at head-quarters considerable anxiety; that crisis, thanks to the firm and explicit language of a cabinet minister at a Mansion House dinner, passed away, but the next scare (which might come up at any moment) may be converted into a very disagreeable reality, so I would add with all the earnestness of which I am capable only two words, 'Be prepared.' My remarks so far may, I fear, be thought somewhat solemn and portentous, but after all we have to look facts, stern facts, in the face, and I have endeavoured to indicate the policy which, in my humble opinion, we ought to adopt towards various questions which affect the Army as a whole.

"In conclusion, gentlemen, I would fain say a few words about the officials and other good fellows with whom I have been associated at the War Office for the past six years. As regards my own connexion with that venerable and much abused institution, I can only say that, having spent nearly twelve years there off and on in various appointments, I have had an exceedingly pleasant and instructive time throughout, but I possessed several advantages. First, I enjoyed that greatest of all blessings, good health; good health reacts on the spirits, and I confess I have always been an optimist. Again I took the post over as a going concern, thoroughly organized by my distinguished predecessor, Sir A. Keogh, and my only merit consists in continuing his policy, which I saw no reason to alter in any way. Next, I had the great good fortune to serve under two sympathetic Secretaries of State, to whom I have always had direct access. Nothing could be more encouraging or appreciative than the attitude adopted by these statesmen toward us and our work, in which they took the keenest interest; this was evidenced not only in private letters to myself, but by statements in Parliament and on the public platform. Then, in the second military member of the Army Council with whom I was brought directly in contact and who happened to be an old brother officer, I had a staunch supporter as long as he was convinced I was on the right track. Coming to my own particular branch, familiarly known in the War Office as A.M.D. and indicating only those officers who have been over six months associated with me, I cannot speak too highly of the loyalty, industry, and ability with which I have been served by the D.D.G., A.D.G. and D.A.D.G.'s, both individually and

collectively; I trusted them fully and I never had cause to regret it. Then I must not forget the Advisory Board. On a recent occasion, when Sir E. Ward, its originator, was dining here, I expressed my opinion of the Board in its corporate capacity; but it is of the two military members I here wish to speak—I allude to the experts in sanitation and tropical medicine respectively. The former by his experience and sound common sense has been of the greatest assistance not only to me, personally, but also to the Master-General of the Ordnance (fourth military member), under whom the Director of Works and Director of Barrack Construction immediately work; what he (our expert) does not know of barrack and hospital construction is not worth knowing, and his opinion on these matters always carries the greatest weight with the authorities. In addition, the high standard which the Corps Journal has attained stamps him as an able editor, but on this point you are quite as good if not better judges than I am. Of the other member, the expert in tropical medicine, it is superfluous to speak; one of the busiest men in London, he is in such request that in addition to his ordinary work he is serving on a Colonial Office Committee and also one dealing with the Insurance Act. His latest exploit was a dash across the Atlantic to deliver several lectures on his particular subject at the special invitation of the Canadian Government, where, I need hardly add, he had a most cordial reception from the Governor-General downwards.

"Well, gentlemen, I fear I have given you an inordinately long harangue, but, being the last occasion on which I shall speak in an official position, I thought it well to explain many things which have occurred during my regime which otherwise might be open to misinterpretation. You may very well think it presumption on my part giving advice and expressing decided opinions in the presence of the man who is to succeed me in a few days, nor would I venture to do so were I not certain that he and I are in absolute accord on the general policy that ought to be pursued; we have not been closeted together for the past three weeks for nothing. I would also like to take this opportunity of expressing my deep obligation to Sir A. Sloggett for his cordial support when P.M.O., H.M.'s Forces (to use the better known designation) in India. Although practically independent of the War Office, by frank intercommunication the work at this end has been greatly facilitated. The high office which he so ably administered and has just vacated I look on as good preparation for the Chair, and with my old friend who sits opposite as his deputy I confidently anticipate an able and progressive regime at the War Office. Reverting to my own inglorious self, I would remark that I have had the good fortune during my forty-one years' service to hold many administrative posts of more or less importance. With the exception of that of P.M.O. of the 6th Division in South Africa, I have not sought any of these; they were offered me and I was never the man to refuse a good thing coming my way. No doubt I have made mistakes; we all do. I may have made enemies—let us hope they are few—and if I have unwittingly done anyone an injury I crave his forgiveness, but it is impossible for any person—I do not care how conciliatory he may be—holding the post of Director-General to please everyone; however, I have endeavoured to be just and to avoid anything in the nature of a job; that I can say with a clear conscience. It only remains for me to thank you from the bottom of my heart for your loyal support at all times and the cordial manner in which you have received the toast of my health."

NOTES FROM KHARTOUM.—Serjeant B. B. Bevan writes: "It is Good Friday and a scorcher!—the thermometer standing at 105 degrees in the shade as we turn out to do battle for the handsome prizes put up for competition by our commanding officer, Captain H. H. Leeson. Here, in this out-of-the-way part of the world, 15 degrees from the equator and 1,500 miles from Alexandria, we have to make our own sport, such as it is. Some days it is rag-time football, or others it is 'let's all go mad' rounders—to-day it is Yip I-addy tennis. Visions of shady avenues of lime trees and mossy lawns, with the soft spring of the turf under one's heels, and the scent of the hawthorn and lilac in the air, fade rapidly away as we take our stand upon a court made of sun-baked Nile mud and camel dung, with the fierce rays of a pitiless sun pouring down its heat from a perfectly cloudless sky. Not a breath of wind stirs the stifling atmosphere as we tighten up the chin-straps of our topees and sally forth.

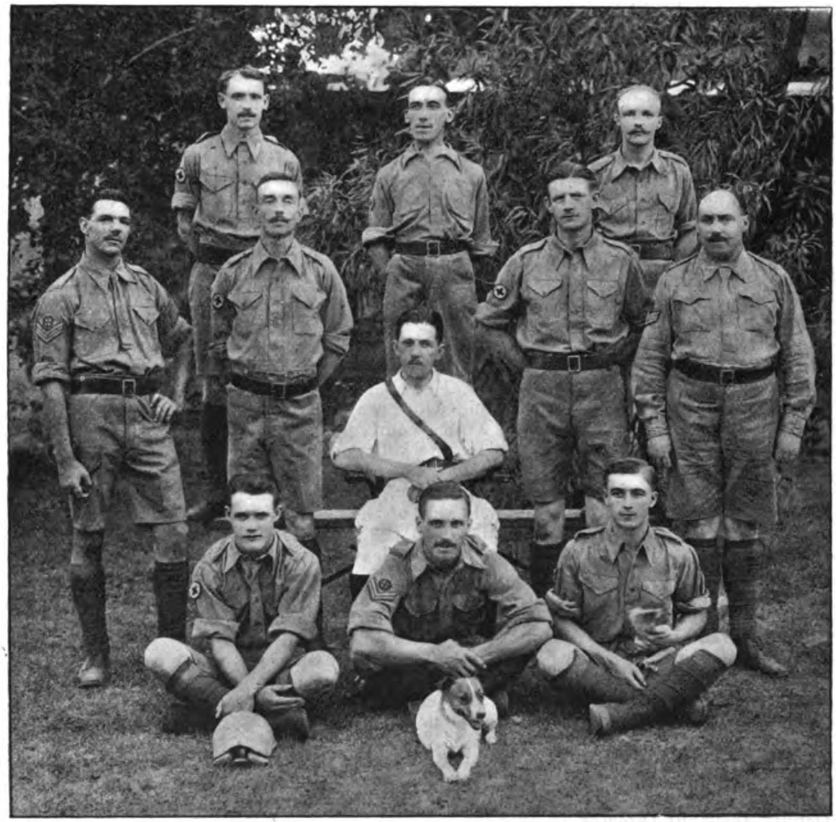
"It is astonishing how soon we have learned to play tennis. Previous to our arrival here in December last only two had ever handled a racket, and now in the short space of four months some have turned out quite good players, especially Privates Ferdinando, Walters, and Oakley.

"*Singles 1st Set.*—Topp (3) *v.* Ferdinando (6). This was a good game but spoiled

by the heat, and limp forms wended their way towards the lemon squash and iced tea, and oh ! the delight in that first long drink.

"*2nd Set.*—Walters *v.* McCombie (receives 40). Everything went on smoothly until the umpire fell off his perch, the others venting their spleens in classical Arabic upon the 'picker up.' Walters won by 6-3.

"*3rd Set.*—Oakley *v.* Serjeant Bevan. Oakley received 15. A lovely set-to; only one slight altercation took place when one of the umpires blinked at the wrong time. Oakley won 6-4.



SUDAN DETACHMENT, R.A.M.C.

Top row, left to right—Privates Ferdinando, Catlin, Topp.
Middle row, left to right—Serjeant Bevan, Private Locke, Captain Leeson, Private McCombie, Staff-Serjeant Colls.
Bottom row, left to right—Private Oakley, Corporals Roden, Walters.

"*4th Set.*—Locke *v.* Walters (Locke received 30). Walters stood at a disadvantage in this game owing to his handicap, but he played up well during the first three games; after that he fell away and Locke won by 6-3.

"*5th Set.*—Captain Leeson (owes 15) *v.* Corporal Roden (receives 15). Corporal Roden played well against a much superior player and would have won if the umpire had not been changed. He was receiving 30 now and again, but Captain Leeson smelt a rat and the umpire lost his job. Captain Leeson won by 6-3.

"This left Captain Leeson with Locke against Ferdinando and Oakley in the semi-finals.

"Ferdinando easily disposed of his opponent by 6-2, and Captain Leeson disposed of Locke to the tune of 6-1, owing to a slight misunderstanding Locke had with the net.

"*Final of Singles.*—Captain Leeson (owes 15) *v.* Private Ferdinando (receives 15). This was the last match of the day, and had it not been for the long game I think Ferdinando would have won. It was a ding dong battle up to 6-6, but as the game progressed Ferdinando got tired and eventually lost by 8-6.

"*Doubles.*—Locke and Topp (receive 15) *v.* Roden and Oakley (scratch). The best team won, but Locke had hard luck with his serves, and Topp's cuts went just over the line. Play was pretty even up to 4 all and then the last two games went to Roden and Oakley.

"Serjeant Bevan and Walters (scratch) *v.* Ferdinando and McCombie (receive 15). Bevan and Walters were the favourites for this set and the game was level up to 5 all. The latter's play was very good at the net, but he lost on his serves, and Ferdinando's side won by 6-5.

"*Final of Doubles.*—Corporal Roden and Private Oakley (scratch) *v.* Privates Ferdinando and McCombie (receive 15). There was some doubt as to who would win this game, as McCombie is the weakest man in our team, but on the form displayed by Ferdinando in his previous games and receiving 15, the odds were evened up. As was predicted, most of the play fell upon Ferdinando, McCombie sticking to his instructions and only hitting the ball when he possibly could not help it, and ended a rattling good afternoon's sport by 7 games to 6.

"The prizes were distributed at the close of play by Captain Leeson: 1st prize, Singles, to Captain Leeson—40 piastres. 2nd prize, Singles, to Private Ferdinando—20 piastres. Prize for Doubles, Privates Ferdinando and McCombie –40 piastres.

"Captain Leeson kindly presented the best 'losers' with 40 piastres, so the money remained in the family after all.

"It was growing dusk as we wended our way to the refreshment bar, and then, oh! the delight of lolling back in a nice comfy deck chair, watching the smoke from our pipes gently wafted to and fro by the soft zephyr breezes that gently kissed our cheeks and stirred the trees so softly that they made no noise; to listen to the awakening life that has been stifled during the day, the dull hum of countless insects, the hoarse croak of the bull-frogs, the wild yelp of the desert dogs, and the dull deep tone of the tom-toms from the native village on the opposite side of the Nile. Darkness falls only too rapidly in this our little world, leaving us in silence deep as the grave. The moon, like a great ball of fire, is slowly rising, bathing us all in its wonderful soft white light, and from out of the night one can hear the weird chant of native boatmen as they ply their unwieldy craft homewards, and the sound of pipes and drums of the Sudanese Band is borne to us across the water on the still night air.

"These are nights that will be remembered when we are listening to the dull patter of the raindrops on the window-pane, or hear the wind howling dismally down the chimney. It is then we will draw our chairs closer to the bright blaze, and picture the Southern Cross just rising above the horizon."

NOTES FROM SIMLA.—Lieutenant-Colonel A. P. Blenkinsop, R.A.M.C., Assistant Director, Medical Services (British Service), writes as follows, dated Simla, May 28, 1914: "*Appointments.* — Captain J. E. H. Gatt has been selected to officiate as Deputy Assistant Director of Medical Services (Sanitary), 2nd (Rawalpindi) Division, during the absence on leave of Major W. H. S. Nickerson, V.C.

"*Leave.*—The grant of general leave to the undermentioned officers has been concurred in: Lieutenant-Colonel F. W. Hardy, six months from April 28, 1914. Major H. Simson, four months and a half from June 18, 1914. Major H. A. Bransbury, six months and five days from June 1, 1914. Captain R. C. Paris, six months from May 16, 1914.

"*Specialist.*—Lieutenant O. W. J. Wynne has been appointed specialist in advanced operative surgery, 8th (Lucknow) Division.

"*Transfers.*—The following transfers have been carried out: Major R. McK. Skinner, from 3rd to 8th Division. Captain G. Petit, from 3rd to 8th Division. Captain W. J. Tobin, from 9th to 5th Division. Lieutenant H. F. Panton, from 3rd to 5th Division."

NOTES FROM MAYMYO.—Major Winkfield writes: "It is not everybody who knows where Maymyo is, so a few notes on this charming little station may be interesting.

It is to Rangoon what Simla is to Delhi, that is to say, the Government of Burma and all those who can get away from the plains come here from March till November. It is 3,500 ft. above sea level and the climate for the whole year is probably one of the best to be found anywhere, varying from a light morning frost at Christmas to a pleasantly warm day in May. There is one British regiment, one Gurkha regiment and a mountain battery, and four of us form the hospital staff, but we take in interesting cases from all over Burma. There is plenty of polo, cricket, Rugby football, hockey, tennis, and some really good golf links; also seventy miles of rides in the jungle where we have weekly paper chases. Shooting one has to travel for, but everything from an elephant to a snipe may be had with a certain amount of leave.

"There have been several changes here during the last year. Colonel Dyson, I.M.S., succeeded Colonel Hehir as our P.M.O. last October, and before he had been in the station a week carried off several prizes at the horse show, including the one for the best horse shown; he has repeated his successes this April. Lieutenant-Colonel Begbie arrived about the same time, relieving our late energetic S.M.O., Lieutenant-Colonel Hale, who went home on leave. Lieutenant-Colonel Begbie is at present taking great interest in the formation of an officers' hospital and garden. Though a small community the R.A.M.C. have been well to the fore in the social life of the station. We organized two most delightful duck shoots at Christmas and in February at the other side of Mandalay, and just lately got up (in aid of the Families' Hospital) some theatricals which were played to packed houses on two successive nights at the regimental theatre and repeated by special request at the club during the April week. Colonel and Mrs. Begbie, Mrs. Winkfield, Mrs. Bennett, and Captain Grant all took part, under the stage management of our temporary surgical specialist, Captain Dick, I.M.S. We were also 'at home' to the station after the polo, the band of the Border Regiment providing two hours' dancing. One of our ladies, Mrs. Winkfield, has carried off several prizes at the ladies' rifle club, and Major Winkfield and Captain Grant have been equally successful on the golf links. We are now settling down to attack the problem of the causation of malaria, which is unfortunately only too prevalent in this otherwise delightful station. We shall be handicapped by the absence of Captain Grant, who has just gone to Japan, whither others of us hope to follow later.

"A Maymyo Clinical Society has recently been started to which we and the I.M.S. belong and our first meeting has been quite a success. During the winter months we had a very instructive staff ride at Mandalay under the guidance of Colonel Walker, D.S.O., General Staff, with Lieutenant-Colonel Begbie as Medical Director. The tour lasted four days and drew together medical officers from all over Burma. It is, I hear, to be repeated next winter in the neighbourhood of the Shan States. Some of us also accompanied General Pilcher on his tour of inspection towards the Chinese frontier—our duty being to select sites for hospitals and make medical arrangements for a force marching towards Yunnan. The scenery *en route* was varied and picturesque and the trip highly instructive, I hope that these few lines from the Back of Beyond may interest your readers more—or less—fortunately situated in more accessible parts of our Empire."

SPECIAL RESERVE OF OFFICERS.

Royal Army Medical Corps.

No. 18 *Field Ambulance.*—Captain Andrew Walker Buist Loudon, M.D., the 2nd East Lancashire Field Ambulance, T.F., to be Captain, dated April 24, 1914.

Lieutenant William R. Gardner, M.B., to be Captain, dated May 18, 1914.

The undermentioned officers resign their commissions: Captain Clarence E. Greeson, M.B., Lieutenants Gerald M. Graham, M.B., and Henry B. Parker, dated April 3, 1914; Lieutenant John McG. Scott, M.B., dated June 17, 1914.

Lieutenants Henry H. Mulholland, Thomas Warrington, and Ewen S. Macphee are confirmed in their rank.

The undermentioned to be Lieutenants (on probation): Cadet James O'Brien, from the Royal College of Surgeons in Ireland Contingent, Officers Training Corps, dated March 26, 1914; Cadet Serjeant James Couper Brash, M.B., from the Leeds University Contingent, Officers Training Corps, dated April 17, 1914; Cadet Serjeant Alexander Caulfield Jebb, from the Glasgow University Contingent, Officers Training Corps, dated April 24, 1914; John Alexander O'Driscoll (late Cadet Lance-Corporal, Royal College of Surgeons in Ireland Contingent, Officers Training Corps), dated April 27, 1914; Cadet (late Cadet Colour-Serjeant) Francis George Macnaughton, from the Edinburgh

University Contingent, Officers Training Corps, dated April 29, 1914; Cadet William McMeekin Chesney, from the Belfast University Contingent, Officers Training Corps, dated April 30, 1914; Ivan Millar Pirrie, M.B., late Cadet Colour-Serjeant, Durham University Contingent, Officers Training Corps, dated May 4, 1914; Cadet Edgar Stanley Rowbotham, from the London University Contingent, Officers Training Corps, dated May 6, 1914; Cadet Lance-Corporal James Melvin, from the Aberdeen University Contingent, Officers Training Corps, dated May 7, 1914; Cadet William Walker, from the Aberdeen University Contingent, Officers Training Corps, dated May 7, 1914; Cadet David Murdoch Marr, from the Aberdeen University Contingent, Officers' Training Corps, dated May 8, 1914; Cadet Lance-Corporal Forster Heddle Brown Norrie, Cadets Robert Scott Cumming, Ian George Macdonald Firth and Robert Boulton Myles, from the Aberdeen University Contingent, Officers Training Corps, dated May 9, 1914; Cadet Serjeant John Forbes William Sandison, from the Aberdeen University Contingent, Officers Training Corps, dated May 11, 1914; Cadet Robert Daniel Lawrence, from the Aberdeen University Contingent, Officers Training Corps, dated May 12, 1914; Cadet Corporal John McCallum Orme, from the Edinburgh University Contingent, Officers Training Corps, dated May 13, 1914; Patrick Walsh, dated May 14, 1914; Cadet William Baly Jepson, from the London University Contingent, Officers Training Corps, dated May 16, 1914; Cadet Francis Robert Henry Mollan, from the Royal College of Surgeons in Ireland Contingent, Officers Training Corps, dated May 20, 1914; Idris David Evans, late Cadet Quartermaster-Serjeant, Durham University Contingent, Officers Training Corps, dated May 21, 1914; Cadet Douglas Horne Murray, from the St. Andrews University, dated May 25, 1914; Cadet Lance-Corporal Archibald Thompson, from the Belfast University Contingent, Officers Training Corps, dated June 2, 1914.

TERRITORIAL FORCE DECORATION.

The King has been graciously pleased to confer the Territorial Decoration upon the undermentioned officers of the Territorial Force who have been duly recommended for the same under the terms of the Royal Warrant, dated August 17, 1908:—

Royal Army Medical Corps.

1st London (City of London) Sanitary Company, Major Lewis Thomas Fraser Bryett.

1st London Clearing Hospital, Lieutenant-Colonel Alexander Barclay Lyon, M.D.

Officers attached to other Units.

Major Andrew Robertson Wilson, M.D., attached to the 4th Battalion, The Cheshire Regiment.

Major William Doig, M.D., attached to the 4th (The Border) Battalion, The King's Own Scottish Borderers.

Captain William Turnbull Barrie, M.B., attached to the 4th (The Border) Battalion, The King's Own Scottish Borderers.

TERRITORIAL FORCE.

Yeomanry.

North Somerset Yeomanry.—Surgeon-Lieutenant John Empson, M.D., resigns his commission, dated May 20, 1914.

Lancashire Yeomanry.—Surgeon-Lieutenant-Colonel Russell E. Wood resigns his commission, and is granted permission to retain his rank and to wear the prescribed uniform, dated June 17, 1914.

Royal Field Artillery.

2nd Northumbrian Brigade, Royal Field Artillery.—Surgeon-Captain Henry Robinson, M.B., resigns his commission, and is granted permission to retain his rank and to wear the prescribed uniform, dated May 20, 1914.

Royal Army Medical Corps.

North Midland Mounted Brigade Field Ambulance.—Captain Arthur C. Goodwin, M.B., F.R.C.S., to be Major, dated June 3, 1914.

2nd South-Western Mounted Brigade Field Ambulance.—Henry Norman Barnett, F.R.C.S.Edin., to be Captain, dated May 16, 1914. John Munro Dupont, M.D., to be Captain, dated May 16, 1914.

3rd Highland Field Ambulance.—Lieutenant William L. Robertson, M.B., F.R.C.S. Edin., to be Captain, dated April 19, 1914.

3rd West Lancashire Field Ambulance.—Robert Dunlop Black Frew, M.D., to be Lieutenant, dated May 14, 1914.

2nd East Lancashire Field Ambulance.—Clement Arthur Webster to be Lieutenant, dated May 16, 1914; Captain Andrew W. B. Loudon, M.D., is seconded for service with No. 18 Field Ambulance, Royal Army Medical Corps, Special Reserve, dated April 24, 1914.

1st Northumbrian Field Ambulance.—Supernumerary Lieutenant Joseph W. Craven, M.B., is absorbed into the establishment, dated April 1, 1914; Ronald Greig Badenoch, M.B. (late Cadet, Durham University Contingent, Senior Division, Officers Training Corps), to be Lieutenant, dated April 28, 1914.

3rd West Riding Field Ambulance.—Quartermaster-Serjeant Edwin Thomas Jones to be Quartermaster, with the honorary rank of Lieutenant, dated June 6, 1914.

1st North Midland Field Ambulance.—Henry Arthur Piggin to be Transport Officer, with the honorary rank of Lieutenant, dated May 1, 1914.

3rd North Midland Field Ambulance.—Guy Fleetwood Haycraft to be Lieutenant (to be supernumerary), dated May 1, 1914.

3rd South Midland Field Ambulance.—John Percy Ingham Harty, M.B., to be Lieutenant, dated April 1, 1914; Captain Bertram M. H. Rogers, M.D., to be Major, dated May 16, 1914; Captain Cyril C. Lavington resigns his commission, dated June 17, 1914.

1st Wessex Field Ambulance.—Lieutenant Langford G. Davies, M.B., resigns his commission, dated June 17, 1914.

2nd East Anglian Field Ambulance.—Lieutenant Benjamin Branford Morgan, M.D., from the 3rd West Riding Field Ambulance, to be Lieutenant, dated April 18, 1914; Ernest Bertram Hinde, M.B., F.R.C.S.Edin., to be Lieutenant, dated April 20, 1914.

3rd East Anglian Field Ambulance.—Lieutenant Walter R. S. Roberts, M.B., to be Captain, dated May 1, 1914.

1st Home Counties Field Ambulance.—Lieutenant Arthur P. Draper, M.B., resigns his commission, dated May 23, 1914.

3rd Home Counties Field Ambulance.—Lieutenant Edwin A. Houchin to be Captain, dated April 12, 1914.

3rd London (City of London) Field Ambulance.—Lance-Corporal Julian Taylor, F.R.C.S., to be Lieutenant, dated June 24, 1914.

4th Northern General Hospital.—John Jekyll Rainforth, M.B., F.R.C.S., to be Captain, dated May 1, 1914; Major George W. Shipman resigns his commission, dated June 6, 1914; Captain Edward C. Clements to be Major, dated June 6, 1914.

1st London (City of London) General Hospital.—The undermentioned officers resign their commissions, dated June 6, 1914: Lieutenant-Colonel Samuel West, M.D., Major Joseph A. Ormerod, M.D. Officers whose services will be available on mobilization:—The undermentioned Majors to be Lieutenant-Colonels, dated June 20, 1914: Sir Anthony A. Bowlby, *Knt.*, C.M.G., F.R.C.S.; Wilmot P. Herringham, M.D.

2nd London Sanitary Company.—Lieutenant William A. Berry, M.B., resigns his commission, dated May 20, 1914.

Sanitary Service.—Captain George A. Brown, M.B., resigns his commission, dated May 23, 1914.

East Lancashire Clearing Hospital.—Thomas Blakeway Wolstenholme, M.B., to be Lieutenant, dated April 8, 1914.

Welsh Clearing Hospital.—Gwylym Robert Lougher to be Quartermaster, with the honorary rank of Lieutenant, dated March 30, 1914.

Wessex Clearing Hospital.—Serjeant Stanley Voysey Warren, from the 1st Wessex Field Ambulance, to be Quartermaster, with the honorary rank of Lieutenant, dated May 20, 1914.

Officers attached to other Units.

Lieutenant-Colonel Charles L. Fraser, F.R.C.S.Edin., resigns his commission, and is granted permission to retain his rank and wear the prescribed uniform, dated May 16, 1914.

Major William F. O'Grady is retired under the provisions of paragraph 116 of the Territorial Force Regulations, and is granted permission to retain his rank and to wear the prescribed uniform, dated May 27, 1914.

The undermentioned Captains to be Majors: Edward C. Stack, F.R.C.S.I., dated

October 22, 1913; Allan F. Rutherford, dated February 1, 1914; William M. Mackay, M.B., dated March 26, 1914.

The undermentioned resign their commissions: Captain Henry A. C. Harris, dated May 23, 1914; Lieutenant Owen J. Parry-Edwards, M.B., dated May 20, 1914; Lieutenant John A. West, dated May 23, 1914; Lieutenant Geoffrey S. Hett, dated June 3, 1914; Lieutenant Albert J. Moone, dated June 10, 1914.

The undermentioned to be Lieutenants: Stanley Southam, dated January 3, 1914; John Douglas Staley, dated January 22, 1914; Jesse Robert Garrood, M.D., dated February 27, 1914: Basil Hughes, M.B., F.R.C.S., dated March 1, 1914; John Chancellor McKenzie, M.B., dated April 20, 1914; Hugh Huntley Robinson, dated April 25, 1914; Archibald Campbell Haddow, M.B., dated May 15, 1914.

TERRITORIAL FORCE RESERVE:

ROYAL ARMY MEDICAL CORPS.

Colonel William Coates, C.B., resigns his commission, and is granted permission to retain his rank and to wear the prescribed uniform, dated June 13, 1914.

Lieutenant-Colonel Charles Graham Grant, from the List of Officers attached to other Units, to be Lieutenant-Colonel, dated May 22, 1914.

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE.

Postings and Transfers.—Staff Nurses: Miss G. S. Brownlow, to London, on provisional appointment; Miss M. A. Roe, to Cork, from Dublin; Miss L. E. James, to Tidworth, from London; Miss E. F. Stephenson, to London, from Shorncliffe; Miss A. M. Rice, to Shorncliffe, from Tidworth; Miss I. M. Whyte, to Aldershot, from London; Miss C. V. E. Thompson, to London, from Aldershot; Miss A. E. M. Steen, to Malta, from Cork; Miss G. Hughes, to Egypt, from London.

ROYAL ARMY MEDICAL COLLEGE.

A CALENDAR of the Royal Army Medical College will be published shortly at the price of 1s. per copy.

This calendar contains a history of the Army Medical School from its first inception; it includes a record of the holders of professional and other appointments, and a complete list of those who have gained prizes at the School and during their subsequent service. Information is also given regarding the courses of instruction.

ROYAL ARMY MEDICAL CORPS FUND.

THE twelfth annual meeting of the Royal Army Medical Corps Fund was held at the Royal Army Medical College on Monday, June 15, 1914, when there was a very large attendance. The Director-General, Army Medical Service (Sir Arthur Sloggett), presided.

The Chairman, in opening the proceedings of the meeting, said that he would call upon the Secretary, Lieutenant-Colonel Davie Harris, to read the report of the Committee for the year 1913.

REPORT OF THE COMMITTEE FOR THE YEAR 1913.

The Committee undertakes, with the assistance of sub-committees, the management and administration of the various funds, viz., the Corps Fund, the General Relief Fund and the Compassionate School Fund. The first of these, the Corps Fund, was originally started with a view to assist in the expenses of the band and dinner, and to pay for memorials of distinguished army medical officers. But from time to time, by various resolutions, its scope has extended to other objects, as its finances have increased.

Committee.—During the past year the following changes have taken place in the Committee: Surgeon-General Sir Launcelotte Gubbins has been succeeded in the Chair by Surgeon-General Sir Arthur Sloggett. Surgeon-General Macpherson has replaced Surgeon-General Babtie. Major Blackwell and Captain W. Benson have taken the places of Major Fell and Major Cotterill in their ex-officio positions, and Colonels

A. Peterkin and E. Butt have relieved Surgeon-General W. Donovan and Lieutenant-Colonel E. M. Wilson as representatives of retired officers.

Accounts.—The accounts of the fund are made up to December 31 yearly, and after being duly audited are presented and passed by committee meeting in January and published in the February Corps News.

On June 1 the accounts were approximately as follows:—

	£	s.	d.
R.A.M.C. current a/c	249	9	8
,, deposit ,, ...	600	0	0
,, investments	2,865	0	0
	£3,714	9	8
General Relief Fund current a/c	128	11	9
,, ,, ,, deposit ,, ...	400	0	0
,, ,, ,, investments	1,600	0	0
	£2,128	11	9
School Fund current a/c	89	14	9
,, ,, deposit ,, ...	300	0	0
	£389	14	9

Making a total of £6,232 16s. 2d., which is an increase of £458 on last year.

The investments are as follows:—

R.A.M.C. Fund—	£	s.	d.
Caledonian Railway Company 4 per cent con. pref. stock No. 1	1,408	0	0
North British Railway Company 4 per cent pref. stock, 1908..	1,457	0	0
	£2,865	0	0

Of which amount the Committee purchased £398 Caledonian Railway at 99½, and £422 North British Railway at 93¾ this year.

General Relief Fund—	£	s.	d.
Canada 3½ per cent stock 1930-50	606	0	0
E.I. Railway 3½ per cent deb. stock	1,060	0	0
	£1,666	0	0

Of which the Committee purchased £560 E.I. Railway at 87¾ this year.

On June 1 of this year our investments stood at the following market quotations:—

	£	s.	d.
Caledonian Railway	1,408	0	0
N. British Railway	1,398	4	5
Canada Stock	563	12	9
E. I. Railway	927	10	0
	£4,297	7	2

As against what we gave for them:—

	£	s.	d.
Caledonian Railway	1,383	9	0
N. British Railway	1,386	12	9
Canada Stock	608	6	9
E.I. Railway	976	8	0
	£4,354	16	6

Or in other words we gave £4,354 for £4,531 stocks, etc., which are now valued at £4,297 7s. 2d.

Subscribers.—The number of subscribers for the year 1913 was 1,116, an increase of 16 on the previous year. The Committee regret to say that there were 184 officers of the Corps on the active list who did not subscribe during the year 1913, many of

whom were fairly senior with over ten years' service. In order to get at these non-subscribers the Committee sent the following letter to each of them last month :—

"ROYAL ARMY MEDICAL CORPS FUND,
"124, *Victoria Street, S.W.*
May, 1914.

"DEAR SIR,—I am desired by the Committee of the above fund to bring to notice that you are one of the few officers on the active list of the corps who do not subscribe to the R.A.M.C. Fund.

"I am further instructed to point out that the fund, which has been in existence since 1902, not only contributes largely to the expenses of the band and dinner (£400 to £500 yearly to the former and £250 to the latter), but pays for all Memorials, gives donations and subscriptions to the General Relief Fund (which assists the N.C.Os. and men of the Corps), Royal School for Officers' Daughters, etc., all of which you as an officer of the Corps get the credit of supporting.

"The fund, moreover, not only allows officers to attend the corps dinner at a much lower charge—namely, 7s. 6d. instead of £1 12s. 6d.—but relieves them of all individual subscriptions for charities and other objects which they would otherwise be asked to support.

"I enclose a Banker's Order Form, which the Committee hope you will complete, sign and return to me.

"Believe me,
"Faithfully yours,
"F. W. H. DAVIE HARRIS, *Lieutenant-Colonel,*
Secretary."

As officers often do not begin to subscribe to the fund until they want to attend the dinner, and other officers sometimes stop their subscriptions when they proceed abroad, the Committee are bringing forward to-day for your consideration a resolution that officers, once having joined and stopped their subscription, shall not be allowed to attend the dinner at the subscription rate until their back subscriptions have been paid, but even that proposal will not hit those who have never joined at all.

Band.—During the year 1913 £432 was voted and paid towards the expenses and upkeep of the band; it is exactly the same amount as was given the previous year. Captain Benson has succeeded Major Cotterill as Band President.

Dinner.—£261 was paid from the fund towards the expenses of last year's dinner, as against £269 the previous year.

The report and accounts of the dinner sub-committee were published in the CORPS NEWS for May of this year.

Major McMunn has replaced Major Lawson on the sub-committee.

The report recommends the charge for dinner tickets to subscribers be again 7s. 6d.

Two hundred and seventeen officers attended last year.

Memorials.—Surgeon-General Macpherson has succeeded Surgeon-General Babtie as chairman of the Memorial Sub-Committee.

During the year 1913 the following are the principal amounts paid by the fund under the head of Memorials :—

	£	s.	d.
Honorarium to Editor of Service Memoirs	10	10	0
General Relief Fund, Royalties of Service Memoirs ..	11	17	0
Expenses incurred at Sister Mary Stanislaus' funeral ..	1	5	10
Insurances at Q.A. Military Hospital Chapel	4	4	0
Royal School, Bath, donation	25	0	0
,, ,, ,, subscription	26	5	0

General Relief Fund.—During the year 1913, £309 18s. 11d. was received as grants from companies as shown in the attached list, including a grant from the R.A.T.A., Aldershot, as compared with £242 10s. 10d. received in 1913.

There is often a difficulty in obtaining subscriptions from companies, as the company officers say that the company has no fund from which they can make a grant. If the men of a company receive all regimental institute profits towards the reduction of their messing, the least they can do is to give a proportionate amount of a day's pay to the General Relief Fund, considering what that fund does for them. When the fund undertook to pay the whole subscription of the Corps to the Union Jack Club, it was on the understanding that each company would subscribe to the General Relief Fund.

£141 3s. 6d. was expended in grants to districts, as compared with £212 the previous year; and £74 was expended in subscriptions, etc., to institutions and societies for the benefit of N.C.Os. and men of the Corps, as compared with £70 in 1912. The fund pays the subscription for the whole of the Corps to the Union Jack Club, viz., £25 4s.

It gives £10 to the Corps of Commissionaires; last year we had eighty-four ex-soldiers enrolled in that corps.

The National Association for the Employment of Ex-Soldiers placed 279 men of the R.A.M.C. in employment during the twelve months ending March 31, 1914. We subscribe £5 to this association.

The Soldiers and Sailors' Help Society, to which we also subscribe £5, found employment for thirty-four of our men during the last year. It helped forty-three with money and sent two to convalescent homes. During the last ten years this society has found employment for 609 of our men and given £817 in money grants.

The officer in charge of R.A.M.C. Records, Aldershot, found permanent work for thirty-six ex-R.A.M.C. N.C.O.s. and men, viz., nine dispensers, three sanitary inspectors, two clerks, two storekeepers, two laboratory attendants, three sick-bay attendants, eight nurses, five porters, one page, one cook.

The School Fund.—This is a constantly decreasing fund. We are now expending at the rate of about £100 a year and the only receipt is interest on the deposit account.

We now provide for eleven children in schools: One in the Drummond Institute, three in the homes for destitute catholic children, and seven in the Royal Soldiers Daughters' Homes, one of whom is in free and for another the father contributes one-half the maintenance allowance.

GENERAL RELIEF FUND.

Grants received during the year 1913.

Company		£	s.	d.
	Aldershot	60	0	0
	Netley	5	0	0
6	Cosham	5	0	0
7	Devonport	5	0	0
8	York	1	10	0
9	Colchester	2	2	0
10	Chatham	1	0	0
11	Shorncliffe	10	0	0
12	Woolwich	10	0	0
13	Edinburgh	5	5	0
14	Dublin	5	0	0
15	Belfast	*Nil.*		
16	Cork	3	0	0
17	Curragh	4	0	0
18	London (Rochester Row)	2	0	0
19	Chester	3	0	0
20	Tidworth	21	0	0
22	Wynberg	5	0	0
23	Pretoria	5	0	0
24	Tempe £10. Serjeants' Mess, £58 14s. 11d.	68	14	11
25	Bermuda	2	2	0
26	Ceylon	*Nil.*		
27	Hong Kong, £2. Serjeants' Mess, £2	4	0	0
28	Gibraltar	3	0	0
29	Jamaica	*Nil.*		
30	Malta	10	0	0
31	Mauritius	2	0	0
32	Singapore	*Nil.*		
33	Cairo	6	0	0
35	London (Grosvenor Rd.)	5	0	0
	Camp of Instruction, Longmoor	15	0	0
	Camp of Instruction, Tidworth	20	0	0
	R.A.T.A., Aldershot	20	0	0
	No. 3 Field Ambulance, Aldershot	1	5	0
		£309	18	11

The Chairman: Does any officer wish to say anything about this report?

I should like to state, gentlemen, that the dinner to-night will be a record one. Up to this morning 264 officers have sent in their names. The previous highest record was 252 in 1911.

Now we come to item No. 2, to vote a grant to the General Relief Fund.

Lieutenant-Colonel Davie Harris: For several years past it has been the custom for officers of the Corps to give a donation or a grant to the General Relief Fund. As you know this fund is essentially for the non-commissioned officers and men, and is

principally maintained by grants from the canteens; as the officers of the Corps do not give anything towards the fund, it has been the custom to make a grant at this meeting. I think Colonel Wilson may have something to say on this.

Lieutenant-Colonel Wilson: I should like to move that the grant be the same as last year, viz., £80. The Director-General may remember that before he went to India it was realized that as the school fund was diminishing it would be necessary to do something from the corps fund in the way of general relief. There are three or four small individual subscriptions of officers to the general relief fund, but it has been considered better as a whole to contribute some substantial sum; the great advantage of this is, that it does away with all little appeals for assistance. It may be necessary later to increase the sum to £100 or £120 a year, but if the general meeting agrees, I should like to propose that the grant be the same as last year, viz., £80.

The Chairman: You think that is enough. Who will second the proposal?

It has been proposed by Lieutenant-Colonel Wilson and seconded by Colonel Murray that the sum of £80 be granted to the general relief fund. Carried unanimously.

The Chairman: We now come to item No. 3—to consider a recommendation that: "Any officer stopping his subscription to the corps fund shall not be able to attend the dinner at the subscribers' rate until his back subscriptions are fully paid."

There is an amendment to this that no officers except lieutenants shall be eligible to attend the dinner at reduced rates unless their subscription for the previous three years have been paid. Well, you have heard what Colonel Harris has said, and I think it is a monstrous thing that a large proportion of our officers do not subscribe to the fund. I think you will agree with me that all men who come into a corps like ours should subscribe to the fund.

After a good deal of further discussion on this subject it was proposed by Colonel Forman, and seconded by Colonel Faunce, "That no officer other than a lieutenant shall get his dinner ticket at reduced rates unless his subscription for the previous three years has been paid, and further any officer having joined and not having paid his subscription to the corps funds shall not be eligible to attend the dinner at subscribers' rate until back subscriptions are fully paid. This resolution to take effect from 1915." This was carried unanimously.

The Chairman: There is one point which two or three of our officers have asked me to bring forward, and that is that the number of distinguished guests who are asked to our dinner should be increased. As you know, there is one guest asked, Mr. Vesey Holt. On this matter I will not express any opinion myself. Of course it is a corps dinner and the number would have to be limited, but I was asked to bring it forward.

Colonel H. Thompson: On a previous occasion when it was brought forward I got up and opposed it. When we have our dinner we have a family gathering; we do not want guests, we want to meet together and see our old friends and talk over old times; if we have guests the joviality of the dinner is destroyed. On the previous occasion we agreed unanimously that the proposal should not be brought up again.

The Chairman: The next item we come to is No. 4, to elect auditors for the ensuing year. Lieutenant-Colonels Julian and Wilson were auditors last year, and I do not think we can do better than propose that these officers be re-elected auditors for the ensuing year.

Colonel Lynden Bell: I will second that. Carried.

The Chairman: The next item is No. 5 on the agenda. Colonel Johnston, who is one of the best known officers in the service, has written me a letter in which he says he is bringing out a history of the corps from its earliest foundation. I myself think it is a most laudable thing, and that we should support him in every way. I do not know if anybody has anything to say on the subject; if not I propose it be referred to the memorial fund committee.

Surgeon-General Donovan: Have you any idea of the cost?

The Chairman: It will cost him about £1,000, and Colonel Johnston has put his hands in his pocket in a very noble way. Even a small sum would be a help towards printing the book, and it would show him that we were willing to assist him to some small extent.

After further discussion it was decided that it be referred to the R.A.M.C. Fund Committee.

F. W. H. Davie Harris, *Lieutenant-Colonel,*
124, *Victoria Street, S.W.* *Secretary.*

ROYAL ARMY MEDICAL CORPS OFFICERS' BENEVOLENT SOCIETY.

PROCEEDINGS OF THE ANNUAL GENERAL MEETING HELD AT THE ROYAL ARMY MEDICAL COLLEGE ON MONDAY, JUNE 15, 1914.

Surgeon-General Sir Arthur Sloggett, *Knt.*, C.B., C.M.G., K.H.S., President, in the Chair.

(1) The Minutes of the last Meeting were read and confirmed.

(2) The Report for the year 1913 was adopted and the accounts, which are printed on page 20, approved.

(3) Colonel J. Lane Notter, Colonel Sir James Clark, Bart., C.B., and Surgeon-General W. G. Macpherson, C.M.G., were elected Vice-Presidents for the ensuing year.

(4) The following grants recommended by the Committee were considered and approved:—

Three orphans of the late Staff-Surgeon D. O. D.	£30
Orphan of Inspector-General R. D.	30
Orphan of Surgeon-Major C. Q.	30
Orphan of Inspector-General D. A.	30
Two orphans of Lieutenant-Colonel H. W. A. M.	30
Orphan of Captain W. J. C.	20
Orphan of Surgeon-General A. S.	20
Orphan of Lieutenant-Colonel H. T. C.	25
Orphan of Surgeon-General J. O.	40
Orphan of Deputy Inspector-General F. T. I.	40
Two orphans of Surgeon-Major W. P. F.	40
(McGrigor pension for boy)	10
Orphan of Surgeon-General T. B.	30
Orphan of Surgeon-Major B. C. S.	25
Orphan of Captain H. H. S.	20
Orphan of Brigade-Surgeon J. W. H.	25
Orphan of Major P. G. I.	30
Three orphans of Captain G. C.	40
Orphan of Surgeon-General R. A. C.	25
Orphan of Surgeon-General J. W. M.	20
Orphan of J. W. C.	20
Orphan of Surgeon-General J. F.	25
Orphan of Brigade-Surgeon H. M.	20
Orphan of Surgeon-General W. L. H.	20
Two orphans of Lieutenant-Colonel H. J. R.	20
Two orphans of Captain and Quartermaster J. B. C.	30
Eight orphans of Lieutenant-Colonel J. W.	40
	£735

(5) The following were elected to serve on the Committee for the ensuing year:—

Major E. M. Pilcher, D.S.O.
Lieutenant-Colonel A. B. Cottell.
Colonel B. Skinner, M.V.O.
Major E. T. F. Birrell.
Colonel E. H. Lynden Bell.
Colonel W. H. Horrocks.
Lieutenant-Colonel E. M. Wilson, C.B., C.M.G., D.S.O.

(6) Surgeon-General W. Donovan, C.B., proposed a vote of thanks, which was carried unanimously, to Surgeon-General Kenny for the way in which he brought the objects and benefits of this Society to the notice of the officers serving in his command.

F. W. H. DAVIE HARRIS, *Lieutenant-Colonel, Secretary.*

124, *Victoria Street, S.W.*

ROYAL ARMY MEDICAL CORPS OFFICERS' BENEVOLENT SOCIETY.

STATEMENT OF ACCOUNTS FOR 1913.

RECEIPTS.	£	s.	d.
To Balance in Bank, January 1, 1913	374	5	10
,, Subscriptions	188	4	6
,, Dividends—			
North Eastern Railway, 3 % Debenture Stock (*less* tax £11 13s. 4d.)	188	6	2
London & North Western Railway, 3 % Debenture Stock (*less* tax £11 13s. 4d.)	188	6	10
Midland Railway, 2½ % Debenture Stock (*less* tax £9 6s. 8d)	150	13	4
Caledonian Railway, 4 % Debenture Stock (*less* tax £6 9s. 8d.)	104	14	4
On £1,177 7s. 9d. Consols	27	14	4
,, Rebate of Income Tax	61	6	0
	£1,283	11	4

EXPENDITURE.	£	s.	d.
By Grants	725	0	0
,, Auditors' Fee	1	1	0
,, Bankers' Charges	0	5	6
,, Secretarial and Office Expenses	90	0	0
,, Stationery	2	10	0
,, Printing "Corps News"	1	0	10
,, Postage	1	17	0
,, Straker, Ltd.	7	0	5
,, Refund of Subscriptions	1	1	0
,, Fees for verification of Consols	0	2	0
,, Balance in Bank, December 31, 1913	453	13	7
	£1,283	11	4

INVESTMENTS.	£	s.	d.
London & North Western Railway, 3 % Debenture Stock	6,667	0	0
North Eastern Railway, 3 % Debenture Stock	6,666	0	0
Midland Railway, 2½ % Debenture Stock	6,400	0	0
Caledonian Railway, 4 % Debenture Stock	2,780	0	0
Consols	1,177	7	9
	£23,690	7	9

Inspected January 6, 1914.

We have compared the above statement with the books and papers relating thereto, and certify that it is correct. We have verified the Bank Balance and the Investment in Consols, and have inspected the Certificate of the Investments in Railway Stocks as set out.

January 8, 1914.

(*Signed*) EVANS, PEIRSON & CO.,
Chartered Accountants.

Report of the Committee for the Year 1913.

(1) The number of subscribers for the year was 177 and the amount of the subscriptions received came to £188 4s. 6d.

(2) The total receipts amounted to £909 5s. 6d., including £61 6s. from a rebate of income-tax; the expenditure totalled £829 17s. 9d.

(3) Twenty-seven applicants representing thirty-five orphans received £725 in grants, varying from £10 to £40 according to the circumstances of the applicant.

(4) During the year a copy of the rules was sent to every officer of the Corps.

(5) The new designation of the society was adopted by a resolution at the last annual general meeting.

List of Subscribers for 1913.

Major S. A. Archer, 10s. 6d; Miss Allen, £1; Major J. D. Alexander, £1 1s.; Major E. T. F. Birrell, £1; Surgeon-General W. Babtie, V.C., C.B., C.M.G., £1 1s.; Lieutenant-Colonel J. F. Brodie, £1 1s.; Major J. M. Buist, £1 1s.; Lieutenant-Colonel T. B. Beach, £1 1s.; Surgeon-General G. D. Bourke, C.B., £1 1s.; Captain C. A. J. A. Balck, £1 1s.; Major F. W. Begbie, £1 1s.; Captain W. W. Browne, £1 1s.; Captain J. E. M. Boyd, £1 1s.; Mrs. G. Bent, £1 1s.; Lieutenant-Colonel A. P. Blenkinsop, £1 1s.; Surgeon-General W. G. A. Bedford, C.M.G., £1 1s.; Lieutenant-Colonel A. F. S. Clarke, £1 1s.; Deputy-Surgeon-General J. S. Comyn, £1; Major J. H. Campbell, D.S.O., £1 1s.; Surgeon-General A. F. Churchill, £1; Lieutenant-Colonel H. E. Cree, £1; Lieutenant-Colonel A. B. Cottell, £1 1s.; Surgeon-General T. M. Corker, £1; Major A. J. Chambers, £1; Major S. L. Cummins, £1 1s.; Major A. Chopping, £1 1s.; Captain G. B. F. Churchill, £1 1s.; Major E. W. W. Cochrane, £1 1s.; Lieutenant-Colonel G. Cree, £1 1s.; Surgeon-General Sir Chas. Cuff, K.C.B., £1 1s.; Captain J. T. Clapham, £1 1s.; Major J. C. Connor, £1 1s.; Lieutenant-Colonel R. J. Copeland, £1 1s.; Captain H. F. M. Chapman, £1 1s.; Colonel Sir James Clark, Bart., C.B., £1 1s.; Captain V. T. Carruthers, £1 1s.; Captain F. Casement, £1 1s.; Lieutenant E. G. H. Cowen, £1 1s.; Lieutenant-Colonel A. M. Davies, £1 1s.; Surgeon-General W. Donovan, C.B., £1 1s.; Surgeon-General J. G. H. Evatt, C.B., £1; Major P. Evans, £1 1s.; Lieutenant-Colonel H. P. Elkington, £1; Surgeon-General P. M. Ellis, £1 1s.; Major W. H. G. Fell, £1 1s.; Major A. A. Fitzgerald, £1 1s.; Colonel R. H. Firth, £1 1s.; Major M. F. Foulds, £1 1s.; Lieutenant-Colonel H. J. Fletcher, £1 1s.; Lieutenant-Colonel R. J. Fayle, £1 1s.; Lieutenant-Colonel N. Faichnie, £1; Major J. V. Forrest, £1 1s.; Lieutenant-Colonel B. Forde, £1 1s.; Surgeon-General C. H. Giraud, £1 1s.; Major R. W. Galwey, £1 1s.; Lieutenant-Colonel J. Girvin, £1 1s.; Lieutenant-Colonel J. S. Green, £1 1s.; Lieutenant-Colonel J. J. Gerrard, £1; Colonel G. T. Goggin, £1; Colonel R. J. Geddes, £1 1s.; Captain J. E. H. Gatt, £1; Captain H. J. Gibson, £1 1s.; Surgeon-General Sir L. Gubbins, K.C.B., M.V.O., K.H.S., £1 1s.; Colonel R. J. D. Hackett, £1; Major A. E. Hammerton, D.S.O., £1 1s.; Lieutenant-Colonel W. E. Hardy, £1 1s.; Major H. Herrick, £1 1s.; Lieutenant-Colonel R. H. Hall, £1 1s.; Lieutenant-Colonel E. M. Hassard, £1 1s.; Captain G. W. D. Hughes, £1 1s.; Lieutenant-Colonel R. Holyoake, £1 1s.; Colonel W. Horrocks, £1 1s.; Lieutenant-Colonel F. W. H. Davie Harris, £1 1s.; Major J. E. Hodgson, £1 1s.; Colonel J. G. Harwood, £1 1s.; Surgeon-General H. G. Hathaway, C.B., £1 1s.; Lieutenant A. S. Heale, £1 1s.; Captain L. C. Hayes, £1 1s.; Colonel R. Jennings, £1; Colonel W. Johnston, C.B., £1 1s.; Colonel H. E. R. James, £1 1s.; Colonel J. M. Irwin, £1 1s.; Lieutenant-Colonel F. W. C. Jones, £1 1s.; Colonel J. M. Jones, £1 1s.; Major J. C. Jameson, £1; Colonel R. Kirkpatrick, C.M.G., £1 1s.; Lieutenant-Colonel M. Knox, £1; Surgeon-General Sir A. Keogh, K.C.B., £1 1s.; Surgeon-General W. Kenny, K.H.S., £1 1s.; Captain W. D. C. Kelly, £1 1s.; Lady Longmore, £1 1s.; Lieutenant-Colonel W. L. Lane, £1; Colonel G. D. N. Leake, £1 1s.; Major P. S. Lelean, £1 1s.; Major H. W. Long, £1 1s.; Captain W. E. C. Lunn, £1 1s.; Captain J. du P. Langrishe, £1; Captain W. F. M. Loughnan, £1 1s.; Colonel H. L. Lynden-Bell, £1 1s.; Colonel W. T. Martin, £1 1s.; Major A. M. MacLaughlin, £1 1s.; Surgeon-General W. G. Macpherson, £1 1s.; Major James Moir, £1; Major A. H. Morris, £1 1s.; Lieutenant-Colonel W. T. Mould, £1; Colonel H. W. Murray, £1 1s.; Colonel H. S. McGill, £1 1s.; Colonel W. A. May, £1 1s.; Surgeon-General W. H. McNamara, £1 1s.; Surgeon-Major E. McSheehey, £1 1s.; F. M. Mangin, £1; Major A. J. McDougall, £1 1s.; Major T. C. MacKenzie, £1 1s.; Lieutenant-Colonel G. S. MacLoughlin, £1 1s.; Major C. B. Martin, £1 1s.; Captain O. R. McEwen, £1 1s; Colonel C. G. Mosse, £1 1s.; Captain D. F. Mackenzie, £1; Colonel J. Maher, £2;

Major C. D. Myles, £1; Surgeon-General J. G. McNeece, £1 1s.; Colonel J. Lane Notter, £1 1s.; Lieutenant-Colonel L. T. Nash, £1 1s.; Lieutenant-Colonel H. Pocock, £1; Major F. J. W. Porter, £1 1s.; Major C. W. Profeit, £1 1s.; Colonel R. Porter, £1 1s.; Major H. S. Peeke, 10s.; Lieutenant-Colonel G. F. Poynder, £1 1s.; Major Ian Paterson, £1 1s; Captain E. C. Phelan, £1 1s.; Major E. M. Pilcher, £1; Colonel E. J. E. Risk, £1 1s.; Lieutenant-Colonel H. D. Rowan, £1 1s.; Lieutenant-Colonel M. W. Russell, £1 1s.; Captain G. F. Rugg, £1 1s.; Major F. E. R. Robinson, £1 1s; Lieutenant-Colonel C. C. Reilly, £1; Captain M. B. H. Ritchie, £1 1s.; Major H. S. Roch, £1 1s.; Deputy-Surgeon-General E. M. Sinclair, £1 1s.; Major A. E. Smithson, £1 1s.; Colonel C. Seymour, £1 1s.; Colonel F. T. M. Symons, £2; Major H. C. F. Stallard, £1; Major George Scott, £1; Captain E. P. Sewell, £1 1s; Colonel Bruce Skinner, £2 2s.; Lieutenant-Colonel A. A. Sutton, £1 1s.; Surgeon-General Sir A. T. Sloggett, £1; Major C. G. Spencer, £1 1s.; Major H. E. Staddon, £1 1s.; Major E. B. Steel, £1 1s; Major F. A. Stephens, £1 1s.; Major S. B. Smith, £1 1s.; Captain J. A. B. Sim, £1 1s.; Captain H. T. Stack, £1 1s.; Lieutenant B. H. H. Spence, £1 1s.; Surgeon-General Sir F. W. Trevor, £1 1s.; Surgeon-General Sir E. Townsend, £1 1s.; Lieutenant-Colonel C. J. W. Tatham, £1 1s.; Colonel H. O. Trevor, £1 1s.; Captain W. I. Thompson, £1 1s.; Lieutenant R. T. Vivian, £1 1s.; Lieutenant-Colonel R. G. Windle, £1 1s.; Colonel D. Wardrop, £1 1s.; Lieutenant-Colonel J. G. Williamson, £1 1s.; Colonel T. P. Woodhouse, £1 1s.; Surgeon-General H. R. Whitehead, £1 1s.; Major A. D. Waring, £1 1s.; Major B. Watts, £1 1s.; Lieutenant-Colonel E. M. Wilson, £1 1s.; Captain M. G. Winder, £1 1s.; Colonel J. H. C. Whipple, £2 2s.; Miss L. Ethel Warren, £1 1s.; Lady Woolfryes, £1 1s.; Major A. H. O. Young, £1 1s.

ROYAL ARMY MEDICAL CORPS CENTRAL MESS FUND.

THE Annual General Meeting of subscribers to this fund was held at the Royal Army Medical College on June 15, 1914, Surgeon-General Sir Arthur Sloggett, *Knt.*, C.B., C.M.G., K.H.S., Director-General, in the chair.

(1) The minutes of the annual general meeting of June 16, 1913, were read and confirmed.

(2) The balance sheet and report for the year ended February 28, 1914, were unanimously adopted. (These were published in the June issue of the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS.)

(3) The following recommendations of the committee as to the conditions of membership and subscription to the central mess fund were submitted to the meeting:—

(*a*) That all officers joining the corps after March 1, 1914, may become subscribers to the central mess fund by paying an entrance fee of £5 5s., and thereafter an annual subscription equivalent to one half of one day's pay of their rank and service, at British rates, on March 1, on which date their subscriptions shall be due in advance. The entrance fee to be paid during the first three months of an officer's service, either in one sum or by equal monthly instalments.

No comments on this proposition being made in response to the invitation of the chairman, he put the resolution to the meeting and it was carried *nem. con.*

(*b*) That all other officers on the active, half-pay, and retired lists shall become members on payment of the above-mentioned annual subscription only.

The hon. secretary explained that this was a re-affirmation, for the sake of clearness, of resolutions adopted at the annual general meetings in 1912 and in 1913. With regard to officers on the retired and half-pay lists who subscribe to the fund the resolution of last year invited established messes to accord to them the privilege of honorary membership. Had any such retired officers subscribed the hon. secretary would have sent their names to the various mess secretaries, drawing their attention to the resolution on the subject. As a matter of fact so far none had done so. He had received a letter from Lieutenant-Colonel E. M. Wilson on the matter since the last meeting of the committee, who no doubt would clear up any misconception there may have been on the part of retired officers.

Colonel Wilson thought that a large number of retired officers would be glad to subscribe to the fund and would greatly appreciate the privilege of honorary membership of various messes, but they were in doubt as to the feeling of mess committees on this matter and thought that it would be a good thing if this could be ascertained. He quite realized that if all retired officers of the Corps were made honorary members of messes some of the latter might be overcrowded.

Lieutenant-Colonel A. B. Cottell felt in the same position as Colonel Wilson, and had some hesitation in availing himself of the privilege of honorary membership for fear that a mess like that in London might be swamped by honorary members.

Colonel Skinner, speaking as President of the London Mess, said that he was surprised that retired officers did not come there more often. He had often wondered what was the reason for this, and could assure them that they would always receive a warm welcome.

The chairman said that he thought the meeting would agree with him that everything should be done to strengthen the links which already existed between past and present officers of the Corps and was sure that retired officers would be received by all messes with open arms. He would, therefore, direct the hon. secretary to write to the various messes informing them of the feeling of the meeting, and inviting their co-operation in this matter.

The resolution was put to the meeting by the chairman and carried *nem. con.*

(*c*) That in future quartermasters be considered honorary members of the central mess fund without payment of an annual subscription.

The chairman said he was sure that this was a very sound proposal and asked if any one had anything to say about it. Carried *nem. con.*

(*d*) That officers subscribing as above and the honorary members there mentioned be relieved of all joining contributions to messes (including those paid on promotion), the payment of such to be a charge on the central mess fund.

The hon. secretary said that the committee had framed this recommendation in response to what was known to be a desire very generally held throughout the Corps. The chairman asked if all agreed to this, and the resolution was carried unanimously.

(*e*) That the above payments from the central fund take place, retrospectively, as from March 1, 1914. Such joining contributions as may have been paid to messes between that date and the adoption of these resolutions will be refunded to subscribers, through the honorary secretaries of the various messes.

(Members of the present class of lieutenants (on probation) who have not paid the above entrance fee will be relieved of joining contributions in future, other than that now payable to the Aldershot mess.)

Carried *nem. con.*

(*f*) That, as a tentative measure, such payments from the central fund be made quarterly on requisition by the honorary secretaries of the various messes.

Carried *nem. con.*

(*g*) That no increase in the rates of joining contributions to messes existing on March 1, 1914, be made without reference to the central mess committee.

Carried *nem. con.*

(*h*) That the case of messes which impose no joining contributions be specially considered.

Surgeon-General Anderson said that he was at the Curragh the other day. The new mess there is approaching completion. All the furniture and equipment in the old mess is in a very bad state and it will mean a large outlay to make the mess anything like what it should be.

Colonel Faunce hoped that the mess at Woolwich would receive favourable consideration under this heading. The hon. secretary explained that when framing these recommendations the committee had the Woolwich mess especially in view. The chairman said he was sure that it would receive consideration from the committee, and that the matter might be left there.

The resolution was carried *nem. con.*

The chairman, referring to messes generally, said that no doubt most of those present were aware that the messes now in existence were those at Aldershot, Cosham, the Curragh, London, Netley, and Woolwich at home, Bangalore, Lucknow, Peshawar, and Rawal Pindi in India, and Roberts' Heights in South Africa. He did not know whether the meeting agreed with him, but he felt very strongly that there was no use in our having messes unless they could be well run. Wherever we have a R.A.M.C. mess it ought to be one of the best. The opening of small messes which could not be

properly kept up did not advance the reputation of the Corps. Some of our messes in India are extraordinarily well done, but he could say from experience that the difficulty of finding bachelors to keep these going was very great.

(4) To consider a recommendation of the committee that the institution of a separate fund for the furtherance of games and athletics is essential. That this fund be called the games fund and be subscribed to by both officers and men. That the most satisfactory way of starting such a fund (from which the Army Athletic Association subscription would be paid) is to draw upon two sources:—

(i) The R.A.M.C. fund, if authority could be obtained for the diversion of a small amount annually (say £25) from this fund.

(ii) Contributions from the various R.A.M.C. companies stationed at home.

In answer to a question as to whether they were prepared to join in a general corps subscription to the Army Athletic Association, nineteen of twenty-six companies expressed their willingness to do so. The report of both sub-committees on the above matter will be found in the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS for May.

The chairman having invited comment on this proposal, Lieutenant-Colonel Davie Harris, secretary of the R.A.M.C. fund, said that such a grant could not be made without interfering with the principles of the R.A.M.C. fund. It would have to come out of the general relief fund, with which he did not think we ought to interfere. An alteration in the original rules of the R.A.M.C. fund could only be made at a general meeting, when due notice had been given of the proposed alterations. A sub-committee of the R.A.M.C. fund had considered the question of a corps subscription to the Army Athletic Association, and had reported that there was no fund available as yet from which such subscriptions might be drawn.

Colonel Skinner thought that this subscription should not come out of the general relief fund, but that the meeting ought to be allowed to vote £25 to a games fund. As the members present represented the R.A.M.C. fund, he did not see why the general meeting of that fund should not be reopened and enabled to vote this sum.

Lieutenant-Colonel Guise Moores pointed out that the R.A.M.C. is the only corps which is not subscribing, as such, to the Army Athletic Association, and that the only way we can get the money with which to do so is from this particular fund.

The chairman thought that due notice would have to be given before anything permanent was done, and that a resolution on the subject should be brought before the general meeting next year. Meantime a grant of £25 might be made as a special case. There was plenty of money available—we did not want to pile up an unnecessary amount of capital. He asked if anyone had anything to say against his suggestion.

Colonel Wilson did not think it right to alter the constitution of the R.A.M.C. fund.

It was proposed by Surgeon-General Kenny, and seconded by Colonel Thompson, that a special grant of £25 be made to the Army Athletic Association.

After some discussion an amendment was adopted directing the central mess committee to re-submit the question of this grant to the committee of the R.A.M.C. fund for their further consideration.

(5) The committee submit for the consideration of the general meeting the question whether payment or part payment of travelling expenses be granted from the central mess fund to members of committee when attending meetings.

The secretary explained that the opinion of the committee was equally divided on this subject. He had worked out the probable expense entailed for railway fares alone, and assuming that only half the members of the committee attended, it would amount to at least £10 per meeting. It was pointed out that expense incurred by members from Scotland and Ireland was considerable, and Colonel Thompson asked whether these distant commands might not be represented by officers recently stationed there who were now at the College or elsewhere near at hand. The hon. secretary said that there was no restriction placed on the various commands and districts as to the selection of their representatives. The chairman thought that the matter might well stand over till next year, when we should be in a better position to judge the financial state of the fund. He therefore proposed that no change be made for the present.

(6) To consider whether an annual R.A.M.C. golf competition be held on some course near London on or about the day of the corps dinner.

There appeared to be no particular interest in this proposition and the matter dropped.

(7) Mr. E. T. Gann was unanimously appointed auditor for the current year.

(8) The meeting closed with a vote of thanks to the chairman.

Note.—It will be seen from para. 3 (*e*) above that a refund of joining contributions to messes since March 1, 1914, will be made through the honorary secretaries of the various messes. Subscribers are requested not to forward individual claims to the Hon. Secretary, Central Mess Fund Committee.

Omissions and errors in list of subscribers published in the June issue of the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS :—

Colonel H. O. Trevor's name should have been included amongst those of the subscribers.

The names of Captain Varvill and Lieutenant Blaikie were misspelt.

A subscription for the year 1913, as well as for the current year, has since been received from Lieutenant-Colonel E. G. Browne.

NOTES ON SPORT AND GAMES.

Cricket.—A correspondent writes from Tidworth: "Up to date we have played ten matches. Of these six have been won, three lost, and one drawn. As last year we have combined with the A.O.C. for the Garrison Cup and some of the other matches. On June 5 Netley visited us, and after a good game we managed to beat them by 64 runs. For us, Captain Sheppard 64, Conductor Spinks 39, Major Steele 38, and Major Meadows 23 not out, were the chief scores. Major Meadows obtained 4 wickets for 50. On June 15 we met the Wiltshire Regiment in the first round of the Hubert Hamilton Cup. They won the toss and elected to bat, but they were quickly dismissed for 62, Major Bush, A.O.C., obtaining 6 wickets for 26 runs, and Major Meadows 4 for 32. We had little difficulty in obtaining the necessary runs, Major Ainsworth making 54 and Captain Sheppard 31. The game was decided on the first innings. In the next round we meet the 3rd Worcestershire Regiment."

Lawn Tennis.—Shorncliffe: At this tournament, held on June 19, Majors B. B. Burke and H. G. Pinches won the Inter-Regimental Challenge Cup. After defeating the Royal Warwickshire pair (Major A. J. Poole and Lieutenant B. L. Montgomery) by 6—3, 1—6, 2—6, 6—2, 6—3, they met the Irish Fusiliers (Captain G. V. W. Hill and Lieutenant H. F. Stokes) in the final, which they won 6—3, 9—7, 6—2. The R.A.M.C. pair, owing 30, reached the final round of the men's handicap doubles, but were defeated 3—6, 2—6. Major and Mrs. Burke won the open mixed handicap doubles from the scratch mark.

Curragh.—Major A. W. N. Bowen and Captain F. L. Bradish won the Inter-Regimental Doubles Challenge Cup, presented by the G.O.C., Major-General Sir Charles Fergusson.

Racing.—At Cork, on June 2, Captain O'Brien Butler won the big steeplechase, the Grand Stand Plate, on Glen Patrick.

J. T. CLAPHAM, *Captain,*
Hon. Secretary.

3, *Homefield Road,*
Wimbledon, S.W.
June 22, 1914.

ROYAL ARMY MEDICAL CORPS ANNUAL DINNER, 1914.

THE Annual Dinner was held at the "Empire and Alexandra Rooms," Trocadero Restaurant, on Monday, June 15, at 8 p.m., the Director-General, Sir Arthur T. Sloggett, *Knt.*, C.B., C.M.G., K.H.S., being in the chair.

The number of officers of the Corps, past and present, attending was 272. This is the largest number ever present at the corps dinner, the previous record having been in 1911, when 252 officers attended.

Mr. Vesey Holt was the only guest.

The following is a list of the officers present:—

Surgeon-Generals.—Sir Arthur T. Sloggett, *Knt.*, C.B., C.M.G., K.H.S. (Director-General), L. E. Anderson, C.B., W. F. Burnett, Sir Chas. McD. Cuffe, K.C.B., W. Donovan, C.B., J. Dallas Edge, C.B., P. M. Ellis, R. W. Ford, D.S.O., Sir

W. Launcelotte Gubbins, K.C.B., M.V.O., W. W. Kenny, K.H.S., Sir Alfred Keogh, K.C.B., W. H. McNamara, C.B., C.M.G., J. G. MacNeece, C.B., W. G. Macpherson, C.M.G., K.H.P., R. H. Quill, G. W. Robinson, C.B., Sir William Taylor, K.C.B., K.H.P., Sir Francis Trevor, K.C.S.I., C.B., H. R. Whitehead, C.B.

Deputy Surgeon-Generals.—W. G. Don, J. H. Jeffcoat.

Colonels.—J. M. Beamish, W. G. Birrell, A. Lang Browne, J. C. Culling, C. E. Faunce, R. H. Forman, R. I. D. Hacket, J. G. Harwood, R. Jennings, J. M. Jones, W. Johnston, C.B., T. J. R. Lucas, C.B., E. H. Lynden-Bell, W. T. Martin, W. A. May, C.B., H. W. Murray, T. J. O'Donnell, D.S.O., M. W. O'Keeffe, A. Peterkin, S. K. Ray, C. C. Reilly, B. M. Skinner, M.V.O., H. M. Sloggett, H. N. Thompson, D.S.O., H. O. Trevor, C. R. Tyrrell, D. Wardrop, C.V.O., S. Westcott, C.M.G., T. P. Woodhouse, Sir Robert Bredon, K.C.M.G. (late Surgeon, A.M.D.).

Lieutenant-Colonels.—F. E. Barrow, G. H. Barefoot, J. F. Beattie, W. W. Beevor, W. W. O. Beveridge, D.S.O., U. J. Bourke, R. P. Bond, C. H. Burtchaell, A. F. S. Clarke, T. H. F. Clarkson, A. B. Cottell, G. Cree, C. Dalton, F. A. B. Daly, C.B., T. Daly, A. M. Davies, W. S. Dowman, H. N. Dunn, N. C. Ferguson, C.M.G., B. Forde, C. Garner, T. W. Gibbard, P. C. H. Gordon, W. L. Gray, R. H. Hall, F. W. H. D. Harris, C. E. Harrison, C.V.O. (Brevet-Colonel), E. M. Hassard, C. W. R. Healey, S. Hickson, K.H.S. (Brevet-Colonel), M. P. Holt, D.S.O., W. H. Horrocks (Brevet-Colonel), H. E. R. James, C.B., J. C. Jameson, F. W. C. Jones, O. R. A. Julian, C.M.G., S. T. Langridge, Sir W. B. Leishman, *Knt.*, K.H.P. (Brevet-Colonel), S. F. Lougheed, C.M.G., T. McCulloch, S. Macdonald, A. A. Macrobin, J. Meek, C. H. Melville (Brevet-Colonel), S. G. Moores, F. J. Morgan, E. M. Morphew, L. T. Nash, F. R. Newland, F. P. Nichols, R. F. O'Brien, D. M. O'Callaghan, M. O'Halloran, W. H. Pinches, G. T. Rawnsley, S. J. Rennie, O. L. Robinson, H. D. Rowan, B. H. Scott, D. D. Shanahan, F. Smith, D.S.O., G. B. Stanistreet, W. H. Starr, C. Stoneham, C.M.G., A. A. Sutton, D.S.O., C. J. W. Tatham, J. Thomson, W. Turner, G. E. Twiss, H. Esmonde White, E. O. Wight, E. M. Wilson, C.B., C.M.G., D.S.O., M. T. Yarr, C. A. Young.

Majors.—R. B. Ainsworth, M. Babington, W. L. Baker, K. B. Barnett, H. P. W. Barrow, H. A. Berryman, E. T. F. Birrell, J. S. Bostock, W. R. Blackwell, E. W. Bliss, J. H. Brunskill, A. Chopping, T. H. M. Clarke, C.M.G., D.S.O., R. W. Clements, E. W. W. Cochrane, V. J. Crawford, S. L. Cummins, B. A. Craig, P. Davidson, D.S.O., A. C. Duffey, W. F. Ellis, H. Ensor, D.S.O., P. Evans, P. H. Faulkner, M. H. G. Fell, E. G. Ffrench, F. G. Fitzgerald, J. V. Forrest, C. E. P. Fowler, E. C. Freeman, W. B. Fry, R. S. H. Fuhr, D.S.O., F. E. Gunter, G. H. Goddard, A. E. Hamerton, D.S.O., L. W. Harrison, D. Harvey, E. C. Hayes, P. H. Henderson H. A. Hinge, H. A. L. Howell, D. O. Hyde, A. J. Hull, L. Humphry, E. T. Inkson, V.C., F. S. Irvine, A. E. C. Keble, J. W. Langstaff, J. W. Leake, P. S. Lelean, A. M. MacLaughlin, T. McDermott, J. F. Martin, C. B. Martin, J. R. McMunn, S. M. Meadows, G. A. Moore, C. K. Morgan, A. H. Morris, C. D. Myles, H. H. Norman, P. S. O'Reilly, H. Pinches, C. W. Profeit, J. Paterson, W. Riach, G. B. Riddick, E. Ryan, A. B. Smallman, E. B. Steel, W. L. Steele, E. W. Siberry, A. Stables, F. A. Stephens, W. J. Taylor, G. St. C. Thom, W. F. Tyndale, C.M.G., T. B. Unwin, B. Watts, A. L. Webb, B. F. Wingate, A. O. B. Wroughton, R. F. Zimmermann.

Captains.—J. A. Anderson, W. Benson, T. S. Blackwell, A. H. Bond, C. R. Sylvester Bradley, C. Bramhall, C. G. Browne, D. S. Buist, J. H. Campbell, H. St. M. Carter, F. Casement, G. B. Churchill, J. M. Crawford, A. Dawson, G. de la Cour, R. M. Dickson, M. G. Dill, N. E. Dunkerton, T. Exton, H. R. Edwards, W. Egan, W. H. Forsyth, A. L. Foster, A. W. Gibson, M. F. Grant, A. C. H. Gray, N. E. Harding, L. C. Hayes, V. C. Honeybourne, F. D. G. Howell, O. Ievers, A. H. Jacob, M. P. Leahy, R. P. Lewis, W. E. C. Lunn, J. St. A. Maughan, F. A. McCammon, W. McConaghy, C. McQueen, T. B. Moriarty, C. R. M. Morris, R. E. U. Newman, R. H. Nolan, C. W. O'Brien, P. O'Brien Butler, A. P. O'Connor, E. M. O'Neill, M. B. H. Ritchie, F. E. Roberts, T. H. Robinson, J. W. L. Scott, W. C. Smales, R. S. Smyth, H. Spackman, W. I. Thompson, E. Thurlow-Potts, A. C. Vidal, W. Wiley, H. T. Wilson.

Lieutenants.—J. L. Huggan, H. C. D. Rankin, A. L. Urquhart.

The following programme of music was performed by selected musicians of the Corps Band, under the direction of Mr. F. Bradley, Bandmaster, R.A.M.C. :—

1	.. ..	"Ménétrier de St. Waast"	.. .. .. *Hermann*
2	.. ..	(a) "Pièce Romantique"	.. .. .. *Chaminade*
		(b) "Minuet" ..	.. .. .. *Bocherini*
3	*Miniature Suite* ..	.. ..	.. .. .. *Eric Coates*
4	.. ..	"Marriage Market"	.. .. .. *Jacobi*
5	.. ..	(a) "Un Peu d'Amour"	.. .. .. *Silesu*
		(b) "Love in Arcady"	.. .. ..*Haydn Wood*
6	*Indian Love Lyrics* ..	.. ..	.. .. *Woodforde Finden*
7	*Valse*	"Chantilly"	.. .. .. *Waldteufel*
8	.. ..	"Yeomen of the Guard"	.. .. .. *Sullivan*
9	*Valse*	"Nuit d'Egypte"	.. .. .. *Arensky*
10	*Two-Step*	"In My Harem"	.. .. .. *Berlin*
11	.. ..	"Laughing Eyes"	.. .. .. *Finck*

"God save the King."

BACK COPIES OF THE "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS" REQUIRED BY THE SERJEANTS' MESS OF THE ROYAL ARMY MEDICAL CORPS AT THE DEPOT, ALDERSHOT.

The Serjeants' Mess of the Depot of the Royal Army Medical Corps, Aldershot, are desirous of completing their file of the Journal of the Royal Army Medical Corps from No. 1, Vol. I.

The Library and Journal Committee are unable to supply the Mess with all the missing copies as several are "out of print," and it was thought that some officers of the Royal Army Medical Corps, who do not require their Journals for binding, would be so good as to present to the Mess the numbers required. The Mess would bear all expense in connexion with posting and packing.

All communications on the subject should be addressed to "The Mess President, Serjeants' Mess, R.A.M.C., Depot R.A.M.C., Aldershot."

The following are the numbers required by the Mess to complete their file :—

1905	1906	1907	1908	1909	1913	1914
January	March	March	December	January	August	January
May	April	April		February		February
June	October	May		March		March
		July		May		
		August		June		
		October		July		
				August		

OBITUARY.

SURGEON MAJOR-GENERAL ROBERT LEWER.

Surgeon Major-General R. Lewer died on May 29 at Southsea. He was born at Wimborne, Dorset, in 1835, and received his medical education at King's College, London. He took the diploma of M.R.C.S.Eng. in 1856, the L.S.A. in 1857, and L.R.C.P.Edin. in 1860. He served in the Royal Navy during the Baltic Expedition, 1855, and was present at the bombardment of Sveaborg, receiving the medal. He joined the Army as Assistant-Surgeon, Staff, in August, 1857, and four months later was transferred to the Royal Artillery. In 1871 he was promoted Surgeon, Staff, and

in the same year was appointed Surgeon to the 9th Lancers. In 1873 he was promoted Surgeon-Major in the Army Medical Department. He served during the Afghan War, 1878-80, being present at the night attack on the rear-guard of June 6, 1879, the operations around Kabul and Sherpur, the defence of Sherpur, the march from Kabul to the relief of Kandahar and the battle on September 1. He was mentioned in Despatches and for his services received the medal with two clasps and bronze star. He was also thanked by Brigadier-General Gough for specially good service during the Afghan campaign. He was promoted Brigade-Surgeon in 1882, Deputy Surgeon-General in 1886, and Surgeon Major-General in 1892. On attaining the rank of Surgeon Major-General he was appointed Principal Medical Officer of Gibraltar and for a time acted as Chairman of the Sanitary Commissioners. He was placed on retired pay in 1895.

BIRTHS.

HUDLESTON.—At Southsea, on April 19, 1914, the wife of Major W. E. Hudleston, of a daughter.

JAMES.—On May 23, 1914, at 28, Northcote Avenue, Ealing, W., to Captain and Mrs. J. James, a son (John Warwick). He lived one day.

JONES.—At Coonoor, South India, on June 3, the wife of Captain A. E. B. Jones, R.A.M.C., of a daughter.

POLHILL.—On June 5, at Woolwich, the wife of Serjeant-Major H. J. Polhill, R.A.M.C., of a daughter.

MARRIAGES.

WILLIAMSON—WILSON.—At the Presbyterian Church, Singapore, on June 10, by the Rev. J. Vance, assisted by the Rev. J. A. B. Cook, Major Alexander Jeans Williamson, Royal Army Medical Corps, to Daisy, only daughter of late Dr. J. P. A. Wilson, Principal Medical Officer, Johore.

MITCHELL—BRUCE.—On June 27th, at St. Barnabas, Kensington, W., T. J. Mitchell, Captain R.A.M.C., third son of the late Robert Mitchell, Esq., Solicitor, Perth, to Blanche Katherine, eldest daughter of the late Robert Bruce, Esq., M.D., F.R.C.S.E., Edinburgh.

DEATH.

LEWER.—On May 29, at Southsea, Surgeon Major-General Robert Lewer, retired, Army Medical Staff, aged 78.

EXCHANGES, &c.

The charge for inserting Notices respecting Exchanges in the Royal Army Medical Corps is 5/- for not more than five lines, which should be forwarded by Cheque or P.O.O., with the notice, to Messrs. G. STREET and CO., Ltd., 8, Serle Street, London, W.C., not later than the 22nd of the month.

Major, due for foreign service Trooping Season 1914-1915, wishes to exchange with an officer low down on roster. Apply "R. N.," c/o Holt & Co., 3, Whitehall Place, London.

A free issue of twenty-five reprints will be made to contributors of Original Communications, and of twenty-five excerpts of Lectures, Travels, and Proceedings of the United Services Medical Society.

Any demand for excerpts, additional to the above, or for reprints, must be forwarded at the time of submission of the article for publication, and will be charged for at the following rates, and additional copies at proportionate rates:—

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12	4	0 2 6	0 1 0				
	8	0 4 6	0 2 0	3 6	0 11	3 2	0 7
	16	0 7 6	0 3 6				
25	4	0 3 0	0 1 3				
	8	0 5 6	0 2 6	4 0	1 3	3 6	0 9
	16	0 9 6	0 4 6				
50	4	0 4 0	0 1 8				
	8	0 6 9	0 3 2	5 0	1 9	4 0	1 0
	16	0 12 0	0 5 3				
100	4	0 5 6	0 2 9				
	8	0 9 0	0 4 4	6 6	3 3	5 6	2 0
	16	0 16 9	0 6 9				
200	4	0 8 6	0 4 0				
	8	0 13 6	0 6 0	9 0	6 3	7 6	4 0
	16	1 3 6	0 8 9				

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Cases for Binding Volumes.—Strong and useful cases for binding can be obtained from the publishers at the undermentioned rates:—

Covers, 1s. 4d. net; binding, 1s. 2d.

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In forwarding parts for binding the name and address of sender should be enclosed in parcel.

Notices.

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, etc. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts, and commands at home and abroad.

All such Communications or Articles accepted and published in the Journal of the Royal Army Medical Corps" will (unless the Author notifies at the time of submission that he reserves the copyright of the Article to himself) become the property of the Library and Journal Committee, who will exercise full copyright powers concerning such Articles.

Matter intended for the Corps News should reach the Editor not later than the 15th of each month for the following month's issue. Notices of Births, Marriages, and Deaths are inserted free of charge to subscribers and members of the Corps. All these communications should be written upon one side of the paper only; they should by preference be type-written, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed The Editor, "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS," War Office, Whitehall, London, S.W.

Communications have been received from Lieutenant-Colonel W. H. Ogilvie, Colonel C. Birt, Major A. H. Safford, Captain M. J. Williamson, Major P. S. Lelean, Lieutenant J. E. Hepper, Colonel R. H. Firth, Captain A. J. Martin, Major J. V. Forrest.

The following publications have been received:—

British: Medical Press and Circular, The South African Institute for Medical Research, The Medical Journal of South Africa, The Hospital, The Medical Review, The Indian Medical Gazette, Tropical Diseases Bulletin, The Practitioner, The Royal Engineers' Journal, The Lancet, Red Cross and Ambulance News, St. Bartholomew's Hospital Journal, The St. Thomas's Hospital Gazette, The Indian Medical Journal, Guy's Hospital Gazette, The Australasian Medical Gazette, The Journal of State Medicine, The Journal of Tropical Medicine and Hygiene, Journal of the Royal United Service Institution, The Red Cross, The Army Service Corps Journal, Public Health, St. Thomas's Hospital Report.

Foreign: The Military Surgeon, United States Public Health Service, Giornale di' Medicina Militare, Memorias do Instituto Oswaldo Cruz, The Medical Department of the United States Army in the Civil War, Bulletin de la Société de Pathologie Exotique, Tidskrift I Militär Hälsovård, Bulletin of the Johns Hopkins Hospital, Bulletin de l'Institut Pasteur, Norsk Tidoskrift for Militaermedicin, Deutsche Militärärztliche Zeitschrift, Schmidt's Jahrbücher, Le Caducée, The Journal of Infectious Diseases, Archiv für Schiffs- und Tropen-Hygiene, Russian Naval Medical Journal, Office International d'Hygiène Publique, American Medicine, Revista de Sanidád Militar.

MANAGER'S NOTICES.

The JOURNAL OF THE ROYAL ARMY MEDICAL CORPS is published monthly, six months constituting one volume, a volume commencing on 1st July and 1st January of each year.

The Annual Subscription is £1 (which includes postage), and should commence either on 1st July or 1st January; but if a subscriber wishes to commence at any other month he may do so by paying for the odd months between 1st July and 1st January at the rate of 1s. 8d. (one shilling and eightpence) per copy. (All subscriptions are payable in advance.)

Single copies can be obtained at the rate of 2s. per copy.

The Corps News is also issued separately from the Journal, and can be subscribed for at the rate of 2s. (two shillings) per annum, including postage. Subscriptions should commence from 1st July each year; but if intending subscribers wish to commence from any other month, they may do so by paying for the odd months at the rate of 2d. per copy. (All subscriptions are payable in advance.)

Officers of the Royal Army Medical Corps possessing Diplomas in Public Health, etc., are kindly requested to register their special qualifications at the War Office. Letters of complaint are frequently received from officers stating that their special qualifications have not been shown in the Distribution List which is published as a supplement to the Journal in April and October of each year. As, however, the particulars of this list are supplied from official sources, officers are reminded that unless the possession of Diplomas, etc., has been registered at the War Office, no entry of such qualifications can be recorded in the Distribution List.

Letters notifying change of address should be sent to the Hon. Manager, "Journal of the Royal Army Medical Corps," War Office, Whitehall, London, S.W., and must reach there not later than the 20th of each month for the alteration to be made for the following month's issue.

It is requested that all Cheques or Postal Orders for Subscriptions to the Journal, Corps News, Reprints, &c., be crossed "Holt & Co.," and made payable to the "Hon. Manager, Journal R.A.M.C.," and not to any individual personally.

All communications for the Hon. Manager regarding subscriptions, &c., should be addressed to

THE HON. MANAGER,
"JOURNAL OF THE ROYAL ARMY MEDICAL CORPS,"
WAR OFFICE, WHITEHALL, S.W.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

AUGUST, 1914.

ARMY MEDICAL SERVICE.

Surgeon-General William W. Kenny, M.B., is placed on retired pay, dated July 14, 1914.

Colonel Tom P. Woodhouse, to be Surgeon-General, *vice* W. W. Kenny, M.B., retired, dated July 14, 1914.

Colonel (temporary Surgeon-General) William G. Macpherson, C.M.G., M.B., Honorary Physician to The King, to be Surgeon-General, dated July 14, 1914.

Colonel Harry S. McGill from the half-pay list, retires on retired pay, dated July 8, 1914.

Colonel Thomas J. O'Donnell, D.S.O., on completion of four years' service in his rank, is placed on the half-pay list, dated July 7, 1914.

Brevet-Colonel Samuel Hickson, M.B., Honorary Surgeon to The King, from the Royal Army Medical Corps, to be Colonel, *vice* T. J. O'Donnell, D.S.O., to half-pay, dated July 7, 1914.

Lieutenant-Colonel Frederick W. C. Jones, M.B., from the Royal Army Medical Corps, to be Colonel, *vice* T. P. Woodhouse, promoted, dated July 14, 1914.

Lieutenant-Colonel Thomas W. Gibbard, M.B., Royal Army Medical Corps, is appointed an Honorary Surgeon to The King, and granted the brevet rank of Colonel, *vice* Surgeon-General W. W. Kenny, M.B., dated July 14, 1914.

ROYAL ARMY MEDICAL CORPS.

Lieutenant-Colonel Maurice P. C. Holt, D.S.O., to be Brevet-Colonel, dated July 4, 1914.

The undermentioned Majors to be Lieutenant-Colonels: John Hennessy M.B., dated July 7, 1914; Lionel A. Mitchell, M.B., dated July 14, 1914.

Major William S. Harrison, M.B., to be Brevet-Lieutenant-Colonel, dated July 4, 1914.

The undermentioned Majors are placed on retired pay, dated July 28, 1914; Stephen W. Sweetnam, Arthur E. Milner.

Captain William W. Boyce, from the half-pay list, is restored to the Establishment, dated June 29, 1914.

Captain Francis Romney Coppinger, from the Indian Medical Service, to be Captain, *vice* J. B. Hanafin, M.B., who exchanges, dated July 15, 1914.

Captain James A. B. Sim, M.B., resigns his commission, dated July 25, 1914.

The undermentioned are seconded for service with the Egyptian Army: Lieutenant Basil H. H. Spence, M.B., dated June 30, 1914; Captain Philip C. Field and Lieutenant Pierce M. J. Brett, M.B., dated July 1, 1914.

The undermentioned Lieutenants to be Captains, dated July 27, 1914: Benjamin Biggar, M.B.; James D. Kidd, M.B.; Charles M. Finny, M.B.; Gordon Wilson, M.B.; William S. R. Steven, M.B.; Edward G. S. Cane; William A. Frost, M.B.; William T. Graham, M.B.; Francis A. Robinson, M.B.; Douglas Reynolds, M.B.; John S. Levack, M.B.; Pierce M. J. Brett, M.B.; Patrick Hayes, M.B.; Thomas A. Weston, M.B.; Walter Bissett, M.B.; Tom C. R. Archer; William L. E. Fretz, M.B.; Charles D. K. Seaver.

Supernumerary Lieutenant Bernard Woodhouse is restored to the Establishment, dated July 25, 1914.

Quartermaster and Honorary Captain Aquila Clapshaw retires on retired pay, dated July 11, 1914.

Quartermaster and Honorary Captain James Watkins retires on retired pay, dated July 25, 1914.

The undermentioned Serjeant-Majors to be Quartermasters, with the honorary rank of Lieutenant: Harry Augustus Ward, dated July 11, 1914; Thomas Grenfell, dated July 25, 1914.

HIGHER RATE OF PAY.—Lieutenant-Colonels F. S. Le Quesne, V.C., and R. H. Penton, D.S.O., have been selected for the increased pay under Article 358, Royal Warrant for Pay and Promotion.

ARRIVAL HOME FOR DUTY.—From West Africa: On July 23, Captain R. R. Lewis.

ARRIVALS HOME ON LEAVE.—Colonel H. J. Barratt; Lieutenant-Colonels J. B. Wilson, H. T. Knaggs and E. G. Browne; Majors G. Dansey Browning, H. Simson, H. E. M. Douglas, V.C., D.S.O., J. Powell and J. F. Whelan; Captains J. H. Douglass, W. Byam, A. W. Byrne, H. S. Ranken, A. S. M. Winder and J. R. Yourell.

POSTINGS.—Northern Command: Captains A. S. Williams and A. H. Jacobs. Western Command: Captains J. A. Anderson, E. M. O'Neill and A. W. Bevis. Aldershot Command: Captains P. C. T. Davy, J. W. L. Scott, A. C. Vidal and G. H. Stack; Lieutenants P. D. Warburton, J. G. Gill, S. M. Hattersley and T. F. P. Breen, Quartermaster and Honorary Lieutenant H. A. Ward. Eastern Command: Captains C. W. Holden, G. R. Painton, G. H. Rees, W. J. Weston, A. S. Littlejohns, G. De la Cour, A. Dawson, F. D. G. Howell, J. B. Grogan, T. W. O. Sexton, E. J. Kavanagh, H. G. Gibson and J. James; Lieutenant D. W. Rintoul. Southern Command: Captains C. G. Browne, E. G. Anthonisz, A. E. S. Irvine, H. E. Priestley, J. S. Dunne, V. C. Honeybourne, V. G. Johnson, E. W. M. Paine, P. Sampson, W. C. Smales, A. H. Bond, G. H. Stevenson, C. McQueen and G. S. Parkinson; Lieutenant J. W. C. Stubbs. Irish Command: Captains G. B. F. Churchill, R. S. Smyth, H. Stewart, F. A. McCammon, W. Egan, F. Forrest, C. R. M. Morris, R. E. U. Newman and W. H. Forsyth; Lieutenants A. Watson and N. V. Nolan; Quartermaster and Honorary Lieutenant T. Grenfell. London District: Majors E. G. Ffrench and F. A. Stephens; Captains T. B. Moriarty, T. T. H. Robinson and R. H. Nolan; Lieutenants A. J. A. Menzies and J. Fitz G. Gwynne. Queen Alexandra Military Hospital: Captain M. P. Leahy, Lieutenant G. E. Dyas. Alderney District: Captain R. W. D. Leslie.

TRANSFERS.—To Dublin: Colonel C. C. Reilly, from Chatham. To Chatham: Lieutenant-Colonel J. Meek, from Cosham. To Western Command: Lieutenant-Colonel W. T. Swan, from Netley; Major M. F. Foulds, from Belfast. To Cosham: Lieutenant-Colonel R. H. Hall, from Tidworth. To Eastern Command: Major L. N. LLoyd, from Preston. To Southern Command: Captain C. Ryles, from Alderney.

TRANSFER TO THE HOME ESTABLISHMENT.—From India: On August 2, Major E. G. Ffrench (by Exchange).

QUALIFICATIONS.—The undermentioned officers have obtained the degrees, etc., noted against their names: Lieutenant H. J. S. Shields, M.B., of the University of Cambridge; Lieutenant P. D. Warburton, the Diploma in Public Health of the University of Sheffield.

APPOINTMENTS.—Colonel C. C. Reilly, Assistant Director of Medical Services, Irish Command. Lieutenant-Colonel J. Meek, Assistant Director of Medical Services, Eastern Command. Lieutenant-Colonel W. T. Swan, Deputy Director of Medical Services, Western Command. Lieutenant-Colonel R. H. Hall, Senior Medical Officer, Southern Coast Defences and Charge of the Alexandra Hospital, Cosham. Major H. R. Bateman, Clinical Pathologist at Shorncliffe.

RETIRED PAY APPOINTMENTS.—Lieutenant-Colonel H. K. Allport, Medical Charge at Golden Hill Fort. Lieutenant-Colonel T. H. Corkery, Medical Charge at Efford Fort and Mutley District.

ROSTER FOR SERVICE ABROAD.—Lieutenant-Colonel R. L. R. Macleod, Major M. P. Corkery, Captains F. J. Garland and G. H. Stevenson have exchanged to higher positions on the roster with Lieutenant-Colonel W. T. Swan, Major A. H. Waring, Captains R. T. Collins and A. S. Arthur respectively.

Major M. M. Lowsley has exchanged to a higher position on the Indian Establishment with Major E. G. Ffrench.

EMBARKATION.—For South Africa: on June 18, Quartermaster and Honorary Lieutenant J. Woollard.

RESULTS OF EXAMINATIONS.—The following results of examinations are notified for general information:—

Passed for promotion to the rank of Lieutenant-Colonel:—

In Appendix xiv, King's Regulations, Part I, Majors G. T. K. Maurice, G. B. Riddick, J. Poe, E. A. Bourke.

In Appendix xiv, King's Regulations, Part I, Subjects 1 and 3, Major H. G. Martin.

In Appendix xiv, King's Regulations, Part II, Major C. F. Wanhill.

In Appendix xi, King's Regulations, Subheads (*d*) ii and iii: Majors S. G. Butler, and E. McDonnell.

In Appendix xi, King's Regulations, Subhead (*d*) iii, Majors S. A. Archer, M. MacG. Rattray, T. C. Lauder, N. J. C. Rutherford, and FitzG. G. FitzGerald.

Passed for promotion to the rank of Major:—

In Appendix xi, King's Regulations, Subheads (*b*) and (*c*) ii: Captain H. C. Sidgwick.

In Appendix xi, King's Regulations, Subheads (*b*), (*d*) ii, and (*d*) iii: Captains R. H. L. Cordner and T. H. Gibbon.

In Appendix xi, King's Regulations, Subheads (*b*) and (*d*) ii, Captains W. McConaghy and W. I. Thompson.

In Appendix xi, King's Regulations, Subheads (*b*) and (*d*) iii, Captain F. C. Sampson.

In Appendix xi, King's Regulations, Subhead (*b*): Captains O. Ilvers, G. F. Rugg, E. H. M. Moore, H. St. M. Carter, F. E. Roberts, J. E. Hoar, R. J. C. Thompson, J. H. Graham, T. Scatchard, M. B. H. Ritchie, E. T. Potts, G. W. W. Ware, W. C. Nimmo, G. B. Edwards, D. de C. O'Grady, A. H. Heslop, J. R. Foster, W. J. E. Bell, T. W. Browne, O. C. P. Cooke, M. O. Wilson, E. M. Wilson, R. G. S. Gregg, H. W. Carson, J. F. Grant, C. E. L. Harding, and C. Kelly.

In Appendix xi, King's Regulations, Subhead (*c*) ii: Captains J. H. Douglass, R. R. Lewis, and C. Ormrod.

In Appendix xi, King's Regulations, Subheads (*d*) ii and (*d*) iii: Captains G. W. G. Hughes, C. R. Sylvester-Bradley, A. A. Meaden, P. Dwyer, J. H. Campbell, E. G. R. Lithgow, W. Benson, E. L. Moss, W. Mitchell, E. J. Elliot, B. Johnson, W. E. C. Lunn, J. H. Gurley, and E. M. Middleton.

In Appendix xi, King's Regulations, Subhead (*d*) ii: Captains P. A. Lloyd-Jones and M. J. Lochrin.

In Appendix xi, King's Regulations, Subhead (*d*) iii: Captains C. W. Holden, J. M. M. Crawford, J. T. McEntire, H. C. Hildreth, A. S. Arthur, A. W. Gater, G. G. Tabuteau, J. M. B. Rahilly, D. de C. O'Grady, and J. A. Bennett.

Passed for promotion to the rank of Captain:—

In Appendix xi, King's Regulations, Subheads (*c*) ii, (*d*) ii, (*d*) iii, and (*h*): Lieutenant J. Hare.

In Appendix xi, King's Regulations, Subhead (*c*) ii: Lieutenants E. G. S. Cane, J. S. Levack, W. Bisset, W. L. E. Fretz, A. G. J. MacIlwaine, W. F. Christie, R. W. Vint, and N. W. Stevens.

In Appendix xi, King's Regulations, Subheads (*d*) ii, (*d*) iii, and (*h*): Lieutenants R. A. Flood, F. C. Cowton, H. J. S. Shields, P. M. J. Power, E. V. Whitby, E. U. Russell, N. T. Whitehead, J. E. Hepper, J. F. O'Connell, S. D. Large, W. O. W. Ball, C. V. Thornton, R. Hemphill, and S. H. Smith.

In Appendix xi, King's Regulations, Subheads (*d*) ii, and (*d*) iii: Lieutenants R. E. Porter, C. Helm, and E. C. Beddows.

In Appendix xi, King's Regulations, Subheads (*d*) ii and (*h*): Lieutenant R. B. Phillipps.

In Appendix xi, King's Regulations, Subheads (*d*) iii and (*h*): Lieutenant A. G. Brown.

MEMORANDUM.

It is notified for general information that the undermentioned officers will be required to proceed to the Commands specified during the coming trooping season.

Definite orders will be issued through the usual channels. The probable dates of embarkation are as shown, and will be adhered to as far as service exigencies permit.

Officers of the same rank other than Lieutenant-Colonels ordered to different Foreign Stations may, by mutual arrangement, have their stations altered; but, while the Director-General is anxious to meet officers' wishes, it is not always possible to give effect to them. Applications for alteration of station, or for exchanges of position on the roster for service abroad cannot be considered if received after the formal orders have been issued for officers to be held in readiness to embark. The cases of Lieutenant-Colonels will be considered when possible.

Family forms should be completed and returned *direct at once*.

Officers proceeding to India, who may be desirous of being posted to any particular division, may name any three divisions in the army to which they are detailed, in order of priority of choice, and their wishes will be communicated to the authorities in India with whom the distribution rests.

NORTHERN ARMY, INDIA.

Lieut.-Col. Burtchaell, C. H., Oct. 30.
,, Russell, J. J., Dec. 1.
,, Scott, B. H., Oct. 8.
,, Morgan, J. C., Jan. 29.
Major McNaught, J. G., Dec. 29.
,, Goodwin, T. H. J. C., D.S.O., Sept. 16.
Major Profeit, C. W., Oct. 8.
,, Birrell, E. T. F., Jan. 14.
,, Corkery, M. P., Dec. 29.
,, Humphry, L., Oct. 8.
,, Gill, J. G., Oct. 1.
,, Curme, D. E., Dec. 9.
,, Langstaff, J. W., Jan. 29.
,, Safford, A. H., Nov. 13.
,, Fry, W. B., Feb. 26.
,, Hyde, D. O., Oct. 30.
,, Fitzgerald, FitzG. G., Sept. 16.
,, Steele, W. L., Oct. 30.
,, Carr, C. H., Dec. 9.
,, Smith, S. B., Dec. 1.
,, Clarke, J. B., Dec. 9.
,, Woodley, R. N., Dec. 29.
,, Mitchell, A. H. McN., Feb. 10.
,, L'Estrange, E. F. Q., Jan. 14.
,, Beatty, M. C., Jan. 14.
,, Rutherford, R., Feb. 10.
Captain Lewis, S. E., Dec. 1.
,, Otway, A. L., Jan. 29.
,, Grant, M. F., Dec. 29.
,, Garland, F. J., Feb. 10.
,, Meaden, A. A., Sept. 16.
,, Moriarity, T. B., Sept. 16.
Captain Stewart, H., Oct. 30.
,, Egan, W., Feb. 26.
,, Newman, R. E. U., Nov. 13.
,, Bevis, A. W., Feb. 10.
Lieutenant Price, R. B., Dec. 29.
,, Hare, J., Dec. 9.
,, Huggan, J. L., Oct. 8.
,, Cowtan, F. C., Nov. 13.
,, Stevens, N. W., Oct. 30.
,, Whitehead, N. T., Oct. 1.
,, Allison, G. F., Sept. 16.
,, Ball, W. O. W., Oct. 30.
,, Beddows, E. C., Jan. 29.
,, Thornton, C. V., Oct. 1.
,, Croker, W. P., Jan. 14.
,, Hemphill, R., Dec. 29.

SOUTHERN ARMY, INDIA.

Lieut.-Col. Kennedy, A., Jan. 14.
,, Le Quesne, F. S., V.C., Feb. 10.
,, Austin, J. H. E., Feb. 26.
,, Tyacke, N., Dec. 9.
Major Silver, J. P., Dec. 1.
,, Clements, R. W., Nov. 13.
,, Prescott, J. J. W., D.S.O., Dec. 29.
,, Lauder, F. P., Jan. 29.
,, Walker, F. S., Jan. 29.
,, Winder, J. H. R., Oct. 1.
Captain Crawford, J. M. M., Feb. 26.
,, Fawcett, H. H. J., Feb. 26.
,, Hanafin, P. J., Jan. 14.
,, Moore, E. H. M., Feb. 26.
,, Emerson, H. H. A., Dec. 9.

Captain Weston, W. J., Oct. 8.
,, Priestley, H. E., Oct. 1.
,, Grogan, J. B., Oct. 1.
,, Stack, G. H., Nov. 13.
Lieutenant Wigmore, J. B. A., Dec. 9.
,, Flood, R. A., Dec. 1.
,, Lang, E. C., Dec. 1.
,, Porter, R. E., Nov. 13.
,, Shields, H. J. S., Oct. 30.
,, Power, P. M. J., Oct. 8.
,, Shaw, R. G., Oct. 8.
,, Philipps, R. B., Oct. 1.
,, Urquhart, A. L., Feb. 26.
,, Sproule, J. C. Sept. 16.
,, Hepper, J. E., Sept. 16.
,, Helm, C., Dec. 1.
,, Crockett, J., Feb. 10.
,, Sealy, H. N., Feb. 10.
,, Jackson, A., Feb. 10.
,, Dyas, G. E., Feb. 26.
,, Rowe, J., Jan. 29.
,, Brown, A. G., Jan. 14.

GIBRALTAR.

Lieut.-Col. Moores, S. G., Dec. 17.
Captain Richard, G. H., Dec. 17.
Lieutenant Bridges, A. B. H., Jan. 20.

MALTA.

Lieutenant Beddingfield, H., Jan. 20.

EGYPT.

Major Thurston, H. S., Jan. 20.
,, Greenwood, A. R., Dec. 17.

BERMUDA.

Major Myles, C. D., Mid. Dec.
,, Cowey, R. V., Mid. Dec.
Captain Nolan, R. H., Mid. Dec.

JAMAICA.

Lieut.-Col. O'Callaghan, D. M., Mid. Dec.
Major Goldsmith, G.M., Mid. Dec.
,, Balck, C. A. J. A., Mid. Dec.
Captain Beadnell, H. O. M., Mid. Dec.
Lieutenant Smith, C. H., Mid. Dec.

CEYLON.

Major Mitchell, L. A., Sept. 10.
,, Henderson, P. H., Sept. 10.
Lieutenant Jones, C. C., Sept. 10.

STRAITS SETTLEMENT.

Lieutenant Whitby, E. V., Sept. 2.
,, Warburton, F. D., Sept. 2.

SOUTH CHINA.

Lieut.-Col. Rawnsley, G. T., Sept. 10.
Lieutenant Russell, E. U., Sept. 10.
,, Poole, L. T., Sept. 10.

MAURITIUS.

Major Harding, D. L., Dec. 19.
Captain Hole, R. B., Dec. 19.
Lieutenant Balfour, T. H., Dec. 19.

NORTH CHINA.

Lieut.-Col. Dalton, C., Sept. 2.
Major Davidson, P., D.S.O., Sept. 2.

SOUTH AFRICA.

Lieutenant Corbett, W. V., Dec. 12.

WEST AFRICA.

Captain Wilson, H. T., Mid. Sept.
,, Bond, A. H., Mid. Sept.
,, Leahy, M. P., Mid. Sept.

The changes in the list issued in April are due to casualties and to extensions of tours abroad. The "waiting" list will now be as follows:—

Lieut.-Col. Rowan, H. D.
,, Elkington, H. P. G.
Major Ward, W. A.
,, Brakenridge, F. J.
Captain Arthur, A. S.
,, Collins, R. T.
,, McConaghy, W.
Lieutenant Davidson, F. C.
,, O'Connell, J. F.
,, Large, S. D.
,, Rankin, H. C. D.
,, Percival, E.
,, Morrison, W. K.
,, Woodhouse, B.

Quartermaster and Hon. Lieutenant J. T. Packard.

LIST OF COMMANDS TO WHICH THE CAPTAINS, ROYAL ARMY MEDICAL CORPS HAVE BEEN POSTED ON THE TERMINATION OF THE 1913-14 CLASS OF INSTRUCTION AT THE ROYAL ARMY MEDICAL COLLEGE.

NORTHERN COMMAND.

Williams, A. S.
Jacob, A. H.

WESTERN COMMAND.

Anderson, J. A.
O'Neill, E. M.
Bevis, A. W.

ALDERSHOT COMMAND.

Davy, P. C. T.
Stack, G. H.
Scott, J. W. L.
Vidal, A. C.

EASTERN COMMAND.

Holden, C. W.

Painton, G. R.
Rees, G. H.
Weston, W. J.
Littlejohns, A. S.
De la Cour, G.
Dawson, A.
Howell, F. D. G.
Grogan, J. B.
Sexton, T. W. O.
Kavanagh, E. J.
Gibson, H. G.
James, J.

ALDERNEY DISTRICT.

Leslie, R. W. D.

SOUTHERN COMMAND.

Browne, C. G.
Anthonisz, E. G.
Irvine, A. E. S.
Priestley, H. E.
Dunne, J. S.
Honeybourne, V. C.
Johnson, V. G.
Paine, E. W. M.
Sampson, P.
Smales, W. C.
Bond, A. H.
Stevenson, G. H.
McQueen, C.
Parkinson, G. S.

IRISH COMMAND.

Churchill, G. B. F.
Smyth, R. S.
Stewart, H.
McCammon, F. A.
Egan, W.
Forrest, F.
Morris, C. R. M.
Newman, R. E. U.
Forsyth, W. H.

LONDON DISTRICT.

Moriarty, T. B.
Robinson, T. T. H.
Nolan, R. H.

QUEEN ALEXANDRA MILITARY HOSPITAL.

Leahy, M. P.

LIST OF COMMANDS TO WHICH THE LIEUTENANTS ON PROBATION FOR THE ROYAL ARMY MEDICAL CORPS NOW UNDERGOING INSTRUCTION AT THE ROYAL ARMY MEDICAL CORPS TRAINING ESTABLISHMENT, ALDERSHOT, HAVE BEEN POSTED.

Names	Posted to	Remarks
Lieutenant Dyas, G. E. ..	London District ..	For duty at the Queen Alexandra Military Hospital.
,, Warburton, P. D.	Aldershot Command.	
,, Gill, J. C. ..	,, ,,	
,, Stubbs, J. W. C.	Southern ,,	
,, Hattersley, S. ..	Aldershot ,,	
,, Rintoul, D. W. ..	Eastern ,,	
,, Watson, A. ..	Irish ,,	
,, Lothian, N. V. ..	,, ,,	
,, Breen, T. F. P. ..	,, ,,	
,, Gwynne, J. F. G.	London.	
,, Menzies, A. J. A.	,,	
,, Wade, E. W. ..	Royal Army Medical College	To complete the course of instruction.
,, Morrison, W. K.	Royal Army Medical College	To complete the course of instruction.
,, Percival, E. ..	Royal Army Medical College	To complete the course of instruction.
,, Linzell, S. J. ..	Royal Army Medical College	To complete the course of instruction.

WARRANT OFFICERS, NON-COMMISSIONED OFFICERS, AND MEN.

PROMOTIONS.

11554	Qmr.-Serjt.	Spencer, R... ..	17.6.14	To be Serjeant-Major, *vice* Serjeant-Major E. W. J. Escott, to H.M. Commission.

BUGLERS.

6593	Boy ..	Berry, A. V. ..	4.7.14	Appointed bugler.
5313	Bugler ..	Crowther, A. W. ..	17.6.14	To the ranks.

EMBARKATIONS FOR ABROAD.

To Sierra Leone, per s.s. "Eboe," June 20, 1914.

11843	Staff-Serjt.	Baxendale, J.	19350	Corporal ..	Barnes, C. J. W.
11566	Serjeant ..	Brown, M. T.	19652	,, ..	Jefford, C. V.
12944	,, ..	Jackson, G.			

THE FOLLOWING N.C.Os. AND MEN HAVE PASSED THE NECESSARY CORPS EXAMINATIONS FOR PROMOTION.

For Quartermaster-Serjeant.

14602	Staff-Serjt.	Hughes, J.	11528	Staff-Serjt.	Bannister, J.
13338	,,	Boxshall, H. S.	15670	,,	Goodread, F. W.

For Staff-Serjeant.

17272	Serjeant ..	Thain, H. J.	14617	Serjeant ..	Aston, H.
18337	,,	Leaker, C.	18341	,,	Nettle, A.
18902	,,	Blundell, W.			

For Serjeant.

11015	Lce.-Serjt.	Phillips, W. E.	1094	Corporal ..	Alloway, H. B.
18832	Corporal ..	Heard, G.			

For Corporal.

1688	Private ..	Drew, G. H. F.	2526	Private ..	Connors, F. T.
4892	,, ..	Flint, B. W.	5225	,, ..	Young, W. T.
5250	,, ..	King, H. T.	2289	,, ..	Harris, H. P.
19295	,, ..	Ferdinando, H.	18512	,, ..	Walkden, J.
4917	,, ..	Chilcott, J. A.	6398	,, ..	Coad, R. H.
4536	,, ..	Asbey, T. C.	4621	,, ..	Bohanna, J.
5370	,, ..	Lawrence, A. E.			

DISCHARGES.

10106	Qmr.-Serjt.	Gooding, E. ..	10.7.14	Termination of second period.
17721	Corporal ..	Fetherston, R. ..	22.6.14	,, ,, first ,,
11090	,, ..	Trueman, H. A. ..	25.6.14	At own request after 18 years.
9987	,, ..	Thorne, J. H. ..	1.7.14	After 3 months' notice.
7026	Boy ..	Smith, G. E. H. ..	16.6.14	Physically unfit for service.
4865	Private ..	Goodrham, W. G...	10.6.14	Payment of £18.
7145	,, ..	Briscoe, E. ..	27.6.14	Physically unfit for service.
7354	,, ..	Porter, L. J. ..	26.6.14	Free under Art. 1,131 Pay Warrant.
17734	,, ..	Cooke, A. K. ..	1.7.14	Termination of first period.

TRANSFERS FROM OTHER CORPS.

18445	Serjeant ..	Crawley, J. E. ..	29.6.14	From Colonial Government.
7828	Dr. ..	Evans, R. B. ..	8.6.14	,, R.F. Artillery.
7829	Private ..	Saker, A. V. ..	8.6.14	,, 16th Lancers.
7830	,, ..	Found, R. G. ..	8.6.14	,, Devon Regt.
7831	,, ..	Miller, S.	11.5.14	,, 1st Bn. Essex Regt.

TRANSFERS TO OTHER CORPS.

7421	Private ..	Kenworthy, F. ..	17.6.14	To 1st Heavy Bde. R.G.A.
7109	,, ..	Smith, J. R. ..	24.6.14	,, 12th Lancers.

TRANSFERS TO ARMY RESERVE.

1038	Pte.	Tuite, B. C. ..	9.5.14	19979	L.-Cp.	Thain, G. E. ..	29.6.14
5527	,,	Simpson, R. ..	8.6.14	1065	Pte.	Dean, A. ..	27.6.14
5540	,,	Hillman, W. ..	13.6.14	5557	,,	Hopkins, R. J...	27.6.14
5533	,,	Cheeseman, G...	11.6.14	5561	,,	Staniforth, S. A.	2.7.14
5541	,,	Briley, B. ..	13.6.14	5575	,,	Rogers, A. ..	9.7.14
5550	,,	Munn, A. ..	18.6.14	5755	,,	Wilkins, C. F. ..	12.7.14
5538	,,	Scott, W. G. M...	14.6.14	5571	,,	Taylor, J. A. ..	4.7.14
5542	,,	Beech, V. ..	14.6.14	5572	,,	Lee, H. C. ..	5.7.14
5524	,,	Owen, H. ..	6.6.14	5574	,,	Percy, D. W. ..	6.7.14
5544	,,	Keep, F. ..	20.6.14	5570	,,	Dobson, F. E. J.	2.7.14
5546	,,	Humphries, F. L.	23.6.14	5569	,,	Seagust, W. F...	2.7.14
5543	,,	Docherty, J. ..	15.6.14	5615	,,	Cook, A. G. ..	5.7.14
5568	,,	Voice, A. E. ..	25.6.14	5777	,,	Wilkinson, J. W.	4.7.14
5179	,,	Clark, T. ..	26.6.14	5583	,,	Payton, J. ..	7.7.14
5556	,,	Southall, H. H...	26.6.14	5565	,,	Day, W. R. ..	3.7.14
5549	,,	Senner, W. ..	23.6.14	5584	,,	Payne, E. R. ..	9.7.14
5548	,,	Adams, J. ..	25.6.14	5577	,,	Curson, H. ..	9.7.14

NOTES FROM LONGMOOR.—Captain W. I. Thompson, writes:—

"ROYAL ARMY MEDICAL CORPS CAMP OF INSTRUCTION.

"The Annual Camp of Instruction for the Aldershot and Eastern Commands was formed at Longmoor, on May 4, 1914, for three periods of training of fourteen working days each, lasting until June 20.

"The Permanent Staff of the Camp, which assembled on April 29, consisted of:—

"Lieutenant-Colonel C. Dalton, R.A.M.C., Camp Commandant; Captain W. I. Thompson, R.A.M.C., Adjutant; Captain and Quartermaster J. Watkins, R.A.M.C., Camp Quartermaster; Serjeant-Major T. E. Coggon, R.A.M.C., Camp Serjeant-Major; Quartermaster-Serjeant J. Enwright, Quartermaster-Serjeant J. Ryan, Quartermaster-Serjeant J. F. Hampton, Commandant's Clerk; Staff-Serjeant F. H. Barker, Staff-Serjeant P. T. Simes, Serjeant A. Bell, Serjeant E. S. Freeman, Lance-Serjeant R. H. Smith, Assistant Instructors; Serjeant J. W. Ashworth, Caterer Serjeants' Mess.

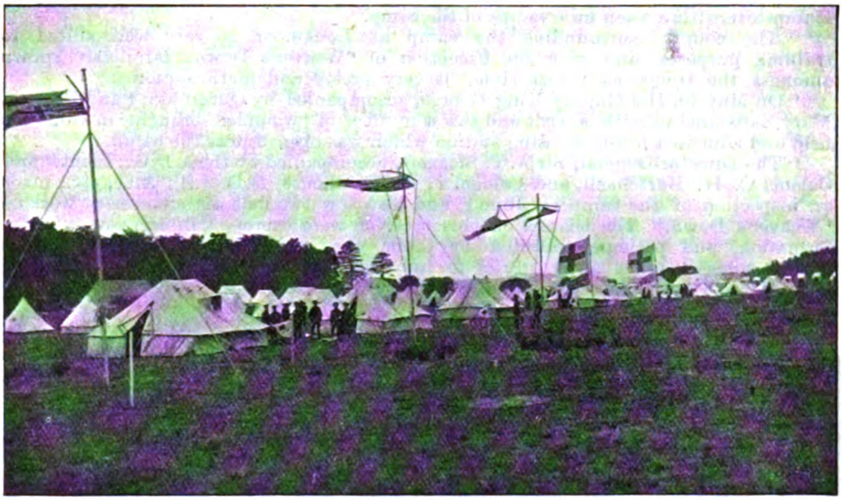
"In addition to the above there were twenty-five rank and file.

"The camp equipment was drawn from the various stores and the camp was laid out ready for the occupation of the first party on their arrival.

"Training began in earnest on May 5, when the two Field Ambulances (Nos. 1 and 2) were formed into their respective sections. It is unnecessary here to go into the details of the actual training day by day, as all ranks of the R.A.M.C. are conversant with the usual lies on which training is carried out.

"An outstanding feature however of this year's training was the application of the new stretcher drill suggested by Major K. A. H. Reed, R.A.M.C., an article on which appeared in the Corps Journal for the month of May, 1914.

"The new stretcher formation was practised over varying types of ground and under various conditions, the tests being very thorough. Most of the days in each period were spent in the field, usually from 9 a.m. until 5 p.m., valuable experience



Field Ambulance Encampment laid out by Sections.

King's visit to Camp of Instruction—His Majesty watching the wounded being brought in.

being gained by both bearer and tent sub-divisions in their respective duties. The results obtained by the cooks in their field cooking were at all times excellent, and their work was much appreciated by both N.C.Os. and men. On several occasions the Field Ambulance worked in conjunction with the infantry brigade stationed

at Bordon, and on these days the greater number of the patients was composed of men of the various battalions.

"Route marches, both by field ambulances as a whole unit and also by sections, were taken twice or three times during each period. The routes selected were well chosen and varied and all ranks became quite familiar with the rural beauties of Hampshire within a ten mile radius of the camp.

"The country surrounding the camp at Longmoor is very well suited to training purposes, and with the exception of 'Weaver's Down,' familiarly known amongst the troops as 'Dust Hole,' is very pretty and picturesque.

"On May 19, His Majesty King George, accompanied by Queen Mary and Princess Mary, honoured us with a visit and saw a number of 'wounded' brought in from the field and admitted to the dressing station which was opened near the camp.

"The Director-General, Sir A. T. Sloggett, accompanied by the A.D.G., Lieutenant-Colonel C. H. Burtchaell, and Colonel T. P. Woodhouse, D.D.M.S., A.C., etc., made an inspection of the camp on June 1, and also saw two field ambulances at work on 'Weaver's Down.' The bearers on this occasion were exercised in the new extended formation, and patients collected by them were removed to dressing stations opened some distance away. Prior to his departure from the field a photograph of No. 1 Field Ambulance was taken, with the Director-General.

Commandant and Adjutant and Serjeants' Mess Members, 1st Period
(Permanent Staff and Nos. 1 and 2 Field Ambulances).

"Other visitors included the Surgeon-General and Officers of the Argentine Forces and Colonel S. Hickson, Inspector of Medical Services, who visited the camp on June 17, and watched the work of the various units and sections.

"The members of the serjeants' mess at the conclusion of each training held a smoking concert, invitations being issued to the officers in camp and the messes of the 15th Hussars, Royal Engineers, and Army Service Corps. Unfortunately for the first and second of these 'smokers' the majority of the 15th Hussars were away from their station, but on each occasion Serjeant-Major Ellicock was present with two or three of their number.

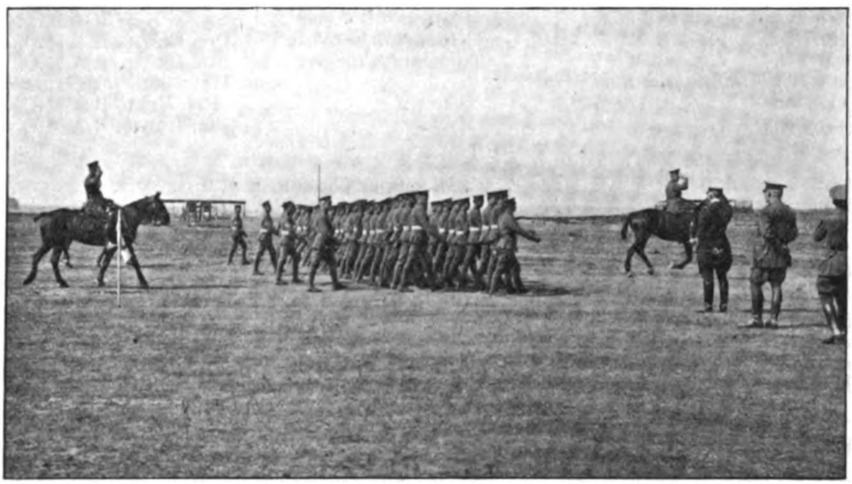
"These concerts were very well arranged and considering that they were more of less impromptu affairs, the talent provided by visitors as well as our own members was particularly good. The officers were 'willing and able' and produced some excellent performers, many 'dark horses' coming to light to illuminate the proceedings.

"The programme of the last of these smokers is appended.

"At the third concert the 15th Hussars were present in full force and by kind permission of their officers a small orchestra came and added greatly to the enjoyment of all.

"Whilst writing in reference to the 15th Hussars it will not be out of place here to say that the generous hospitality shown by the members of the serjeants' mess of that regiment was greatly appreciated by all the members of the R.A.M.C. serjeants' mess who were present at the camp.

"During the first period they invited the serjeants to a whist drive followed by a dance. This was a very enjoyable affair and was well attended. Prizes were given to ladies and gentlemen for the whist drive. The first prize for gentlemen was carried away by a member of the R.A.M.C., though I modestly refrain from giving his name. During each training the members of the serjeants' mess were fortunate in having several pianists amongst their number and pleasant evenings were spent in the mess in playing, singing, 'bee-spelling,' 'bizz-buzzing,' and last but not least 'telling the tale.' Football, boxing, cricket, and scouting were indulged in by many of the N.C.Os. and men during their leisure hours, whilst at the conclusion of the first period a camp fire concert was held and a good programme provided.



March past by Sections of No. 1 Field Ambulance, 3rd Period, Director-General taking the Salute.

"At the conclusion of each period a serjeants' mess meeting was held and a rather important point thoroughly debated. This was a motion for the centralization of a fund for the purpose of providing mess equipment and furniture for the use of the camp of instruction serjeants' mess. Hitherto it has been customary to distribute the profits accruing from the bar, etc., amongst the members of the various messes who had been present at the camp, but as the sum returned to each individual was so small, and would not be missed, it was thought that the whole amount could be reserved and formed into a fund for the purpose stated. The opinion of the members was unanimous and next year we hope to see in the mess tent some property of our own in place of the hired equipment, etc.

"Although in each training period the work was very strenuous and thorough, a very willing spirit was shown by all ranks and everyone worked with a good heart. In camp and in the field the spirit of comradeship was very evident and the reunion of old friends helped to add to the enjoyment of everyone.

"In conclusion a word of thanks is due to the clerk of the weather for producing very few wet days, though he was fairly liberal with his cold nights and winds. Many expressions were heard to the effect that it was hoped an equally enjoyable camp may be experienced next year."

"PROGRAMME.

(1)	*Opening Chorus*	'Let's all go down the Strand'	ORCHESTRA.
(2)	*Song*	'You made me Love You'	Pte. BAGLEY, R.A.M.C.
(3)	*Song*	Selected	Pte. FOULDS, R.A.M.C.
(4)	*Song*	'Paree'	Qmr.-Sjt. PETTLEY, R.A.M.C.
(5)	*Toast*	'Commandant and Officers'	CHAIRMAN.
(6)	*Selection*	'Nights of Gladness'	ORCHESTRA.
(7)	*Song*	'Sweet Genevieve'	Sjt. SMITH, R.A.M.C.
(8)	*Recitation*	'Ribbons'	Sjt.-Major FIGG, R.A.M.C.
(9)	*Selection*	'Wedding Glide'	ORCHESTRA.
(10)	*Song*	Selected	Pte. WILKINS.
(11)	*Song*	'A Rale Ould Irish Gentleman'	Capt. CADDELL, R.A.M.C.

"*Interval.*

(12)	*Selection*	'Ragtime'	ORCHESTRA.
(13)	*Song*	'Two Eyes of Grey'	Lt. BALL, R.A.M.C.
(14)	*Recitation*	'Coming Home'	Sjt.-Major FIGG, R.A.M.C.
(15)	*Song*	'Father O'Flynn'	Sjt. STEER, R.A.M.C.
(16)	*Song*	'Farmer Giles'	Staff.-Sjt. SIMES, R.A.M.C.
(17)	*Toast*	'Visitors'	CHAIRMAN.
(18)	*Song*	'Little Grey Home in the West'	Pte. LEWIS, R.A.M.C.
(19)	*Song*	'Tipperary'	Pte. LEWIS, R.A.M.C.
(20)	*Impersonations of Sam Mayo*		Sjt. HAYWOOD, 15th Huss.
(21)	*Song*	Selected	Pte. BELL, R.A.M.C.
(22)	*Song*	'My Hero'	Pte. LEWIS, R.A.M.C.

"THE KING.

Chairman .. .. Sjt.-Major COGGON, R.A.M.C.
Committee .. .. Staff-Sjt. COURT, R.A.M.C., Qmr.-Sjt. BAKER, R.A.M.C., Sjt. STEER, R.A.M.C., and Sjt. ASHWORTH, R.A.M.C.
Accompanist .. .. Sjt. STEER, R.A.M.C.

"Numerous encores were called for and responded to. The Toast 'Commandant and Officers' was replied to by Major Bostock, R.A.M.C., who during the course of his speech referred to the previous day's victory of the English Polo Team, and to the return of the 'Cup.' This part of the speech was greatly appreciated by the 15th Hussars. Serjeant-Major Ellicock, 15th Hussars, responded to the toast of the 'Visitors.'

"Sundry 'sweet nothings' brought the evening to a close, eternal friendships being sworn on all sides."

NOTES FROM SHORNCLIFFE.—Major Hooper writes: "Officers and men who have been stationed at Shorncliffe, and in their time subscribed to the making of the small recreation ground below the hospital will be pleased to hear that this is now almost completed.

"The result has been an improvement in the football and cricket play, owing to the increased facilities for practice.

"The football team—a photograph of which is enclosed—played thirty-two matches last season. They entered for the Harwood Cup, for the Folkestone Charity Cup, and the East Kent Wednesday League.

"This team was beaten by Woolwich in the Harwood Cup but worked their way through to the finals of the Charity Cup, being beaten only by the Royal Irish Fusiliers after a strenuous game 3 goals to 1.

"We were presented with silver medals by the Folkestone Charity Committee, and Major Lawson gave them to each player and congratulated the team on their success.

"Summer training has interfered to some extent with cricket, but there have been several good matches, notably one against the 4th London General Hospital stationed here for their annual training. Colonel Atwood Thorne afterwards entertained the two teams and their supporters to tea. No. 11 Company subsequently gave a smoking concert and whist drive which was highly successful.

"The Shorncliffe Garrison Lawn Tennis Tournament was held on the Officers' Recreation Ground in June. Major Burke and Major Pinches, R.A.M.C., Dover, were

successful in winning the Regimental Cup, and Miss Bateman the Ladies' Handicap Singles. Major and Mrs. Burke also won the mixed handicap doubles. Major Hooper was hon. secretary of the tournament."

NOTES FROM MALTA.—Serjeant-Major A. T. Fitch writes: "Seventeen N.C.Os. and men proceeded to Scutari, Albania, on June 3, 1914, in relief of the N.C.Os. and men who had been stationed there since June, 1913; the relieved party returned to Malta on H.M.S. 'Duke of Edinburgh' on June 9, 1914. A smoking concert was given as a welcome on their return.

"The cricket team is not doing so well as expected owing, perhaps, to the fact that our captain, Major H. L. W. Norrington, is now at Scutari and also some of the players, but we hope to do better as the season advances.

"Our officers have again shown their worth in the tennis world. In the annual Malta tennis tournament Major Norrington and Major Norris tried hard to retain the 'Ships and Regimental Cup' but were beaten in the final after a very close game; they however, partly made up for this loss by winning the handicap doubles. Major Norrington also had the pleasure of being first in the mixed doubles handicap from scratch, and first in the open doubles.

"Our team in the Garrison W.Os.' and Serjeants' Tennis League is going strong and is in a good position in the league table, and we hope to find a place at the top by the end of the season.

"Our Dance Club brought a highly successful season to a close on Friday, May 22, 1914, with a quadrille party at the Verdala Gymnasium.

"The gymnasium was beautifully decorated and reflected very great credit on the members of the Dance Committee, who worked with great skill and no less taste in producing so excellent a result.

"Dancing commenced at 8 p.m., and continued with unabated vigour until 'Paddy O'Rafferty,' followed by the 'King' brought a most enjoyable entertainment to a close at 3 a.m.

"Over 200 guests attended, including our D.D.M.S., Colonel M. W. Russell, our commanding officer, Lieutenant-Colonel T. G. Lavie, our company officer Major C. R. Evans, Captain Vaughan and Lieutenant Carlyle, who all joined heartily in the sport and appeared to enjoy themselves thoroughly.

"Representatives of every corps in the garrison, as also from all H.M. ships in the harbour attended; it was a pleasant feature of the evening that so many of our confrères of the Royal Navy Sick Berth Staff were present.

"The duties of M.C. was most capably performed by Quartermaster-Serjeant Kerstein, ably assisted by Corporal Hutchings and Private O'Flaherty.

"Much credit is due to Quartermaster-Serjeant Kerstein, President of the Dance Committee, Private Woods (Hon. Sec.), and the members who carried out their many duties most ably indeed."

NOTES FROM BERMUDA.—Lance-Corporal Cotton writes: "As there have been no notes from Bermuda in the CORPS NEWS during the past few years, the opportunity now offers to forward a contribution on a much discussed topic of conversation in the Army, viz., messing.

"Our company, although a diminutive one compared with some, can I think, easily hold its own with any of our other companies at home or abroad. Some two years ago the old system of messing here was abolished and a new one introduced by Serjeant-Major Birch. A grant was obtained from the canteen fund to refurnish the dining room with crockery, etc., and a crockery fund, financed by the dining members at 6d. per month, was established. This covers all expenditure for the renewal of cups, saucers, plates, teapots, milk jugs, water jugs, washing tablecloths, etc. The serjeant-major took personal charge of the mess book for two or three months to the complete satisfaction of all. As a result of the interest he took in the matter, the messing here at the present time is without doubt a fair example of the possibilities that exist for a N.C.O. in charge of messing, if he has the messing at heart.

"Below is a sample of two of the meals appearing on our menu for last week:—

"(1) Roast chicken, with sage and onion stuffing, potatoes, cabbage, and currant roll.

"(2) Roast pork, apple sauce, potatoes, onions, cabbage, and apple tart.

"These are two fairly good examples of the messing and are daily occurrences, not merely written down on paper and forgotten. The remaining meals are as good as the above and a complaint in 25 Company R.A.M.C. has been unheard of during the past two years. The inclusion of such delicacies as chicken in the menu is merely a system of exchange with the ration meat. The messing paid is 4d. a day.

"As an experiment the N.C.O. in charge of the mess book for June (Lance-Corporal Truscott), organized a picnic to be entirely provided for out of the mess book. We left our quarters at about 10.30 a.m. and walked to the rendezvous, a delightful little bay on the south side of the island. On arrival there, Lance-Corporal Truscott and our two cooks (Privates Taylor and Gregory) prepared a meal consisting of cold roast pork, ham, pickled beef, potatoes, coffee, and rolls, etc., while the remainder of the party explored the surrounding country.

"After a glorious repast, carefully laid out in the shade of some friendly trees, a little exercise to aid digestion was suggested, and the majority of the party, being swimmers, immediately made for the water, and after a good swim commenced searching the bed of the ocean for marine specimens.

"The married families, who were invited by the company, having arrived during the afternoon, we all sat down to an excellent tea, on a small headland overlooking the bay. Tea being over and cleared away the party gradually broke up and strolled homewards, arriving there about 7.30 p.m., after an outing thoroughly enjoyed and appreciated by all.

"The mess book is still in credit, although the grant of £1 from the canteen fund has not been made use of, and a monthly picnic has been suggested by Lance-Corporal Truscott, who is willing to continue in charge of the mess book, and defray the cost of the picnic from the messing money. These events promise to be eagerly looked forward to by the company."

NOTES FROM SIMLA.—Lieutenant-Colonel A. P. Blenkinsop, R.A.M.C., Assistant Director, Medical Services (British Service), writes as follows, dated Simla, June 25, 1914:—

"*Appointments.*—Major H. O. B. Browne-Mason has been selected to officiate as Assistant Director Medical Services (British Service) during the absence on leave of Lieutenant-Colonel A. P. Blenkinsop.

"*Leave.*—The grant of general leave (ex-India) to the undermentioned officers has been concurred in: Lieutenant-Colonel A. P. Blenkinsop, two months, combined with two months privilege leave from July 9, 1914. Major R. F. Ellery, three months and twenty-five days from July 17, 1914. Captain S. G. Walker, six months from August 11, 1914. Lieutenant F. A. Robinson, three months from June 28, 1914.

"*Specialist.*—Lieutenant P. Hayes has been appointed specialist in dermatology 5th (Mhow) Division.

"*Transfers.*—The following transfers have been ordered: Captain C. A. T. Conyngham from 5th to 9th Division; Lieutenant P. Hayes from 9th to 5th Division."

SPECIAL RESERVE OF OFFICERS.

Royal Army Medical Corps.

No. 18 *Field Ambulance.*—Lieutenant-Colonel (Honorary Major in the Army) Andrew Alexander Watson, R.A.M.C. (T.F.), to be Lieutenant-Colonel, dated May 1, 1914.

Captain Wilson H. P. Hey, M.B., F.R.C.S., resigns his commission, dated July 4, 1914.

The undermentioned Captains to be Majors: William H. G. H. Best, dated April 30, 1914; James C. Furness, dated June 18, 1914.

Lieutenant Hubert Cox resigns his commission, dated July 8, 1914.

The undermentioned Lieutenants to be Captains: Eben S. B. Hamilton, M.B., dated June 29, 1914; William Crymble, dated July 13, 1914.

Lieutenants Alexander J. Gibson, M.B., Thomas W. Wylie, M.B., and Charles R. McIntosh are confirmed in their rank.

The undermentioned to be Lieutenants (on probation): Cadet Corporal William Siegfried Dawson, Cadet Corporal George Perkins, and Cadet Griffith Ivor Evans, from the Oxford University Contingent, Officers Training Corps, dated May 20, 1914; Cadet Serjeant Thomas William Clarke, M.B., from the Edinburgh University Contingent, Officers Training Corps, dated May 26, 1914; Cadet Staff-Serjeant Francis Dighton Annesley, from the London University Contingent, Officers Training Corps, dated May 26, 1914; Cadet George Harold Rossdale, from the Oxford University Contingent, Officers Training Corps, dated June 3, 1914; Cadet Serjeant John Cullenan, from the Belfast University Contingent, Officers Training Corps, dated June 4, 1914; Cadet Arthur George Fisher, from the Dublin University Contingent, Officers Training Corps, dated June 5, 1914; Cadet Corporal Ian Dishart Suttie, M.B., from the Glasgow University Contingent, Officers Training Corps, dated June 15, 1914; Henry Cuthbert Bazett, M.B., dated June 19, 1914; Cadet Corporal William Bryars and Cadet George Chesney, from the Belfast University Contingent, Officers Training Corps, dated July 7, 1914.

TERRITORIAL FORCE.

Royal Army Medical Corps.

Highland Mounted Brigade Field Ambulance.—John Broadfoot, M.B., to be Lieutenant, dated May 1, 1914.

1*st South Western Mounted Brigade Field Ambulance.*—Reginald Grieveson James to be Transport Officer, with the honorary rank of Lieutenant, dated May 19, 1914.

2*nd South Western Mounted Brigade Field Ambulance, Royal Army Medical Corps.*—Lieutenant Rupert Waterhouse, M.D., to be Captain, dated October 15, 1913.

The order of precedence of the undermentioned Captains, whose appointments were announced in the *London Gazette*, May 15, 1914, to be as now shown: John Munro Dupont, M.D., Henry Norman Barnett, F.R.C.S.Edin.

1*st West Lancashire Field Ambulance, Royal Army Medical Corps.*—Samuel McCausland to be Lieutenant, dated June 1, 1914.

3*rd East Lancashire Field Ambulance.*—Captain Wilson H. P. Hey, M.B., F.R.C.S., resigns his commission, dated July 4, 1914.

3*rd Welsh Field Ambulance.*—Quartermaster and Honorary Lieutenant William John Ackland to be Transport Officer, with the honorary rank of Lieutenant, dated April 19, 1914.

Alfred Thomas to be Quartermaster, with the honorary rank of Lieutenant, dated April 19, 1914.

3*rd South Midland Field Ambulance.*—Henry James Drew Smythe to be Lieutenant, dated June 18, 1914.

2*nd Home Counties Field Ambulance.*—Captain William E. Alston, M.D., from attachment to units other than medical units, to be Captain, dated June 20, 1914.

1*st London* (*City of London*) *Field Ambulance, Royal Army Medical Corps.*—Cadet Lance-Corporal Eric Donaldson, from the University of London Contingent, Senior Division, Officers Training Corps, to be Lieutenant, dated July 11, 1914.

4*th Southern General Hospital.*—Henry Barrington Briggs to be Quartermaster, with the honorary rank of Lieutenant, dated May 7, 1914.

2*nd London Sanitary Company, Royal Army Medical Corps.*—William John More Slowan, M.D., to be Lieutenant, dated June 9, 1914.

Sanitary Officers.—Major John Robertson, M.D., resigns his commission, dated July 25, 1914.

East Anglian Clearing Hospital.—Major James S. Warrack, M.D., from attachment to units other than medical units, to be Major, dated June 25, 1914.

William Redpath, M.B., to be Lieutenant, dated July 18, 1914.

Wessex Clearing Hospital.—Alfred John Hopkinson Iles to be Lieutenant, dated June 9, 1914.

OFFICERS ATTACHED TO OTHER UNITS.

Lieutenant-Colonel (Honorary Major in the Army) Andrew A. Watson is seconded for service with No. 18 Field Ambulance, Royal Army Medical Corps (Special Reserve), dated May 1, 1914.

Lieutenant-Colonel and Honorary Surgeon-Colonel David Lennox, M.D., resigns his commission, and is granted permission to retain his rank and to wear the prescribed uniform, dated July 22, 1914.

Captain Samuel M. Sloan, M.B., to be Major, dated May 22, 1914.

Captain John Orr, M.B., resigns his commission, and is granted permission to retain his rank and to wear the prescribed uniform, dated July 4, 1914.

Captain Thomas Harper, M.B., resigns his commission, and is granted permission to retain his rank and to wear the prescribed uniform, dated July 22, 1914.

Captain George B. Gill, M.B., resigns his commission, dated July 24, 1914.

Lieutenant Robert Henry to be Captain, dated July 9, 1914.

Lieutenant Kenneth Mckinnon, M.B., resigns his commission, dated July 11, 1914.

Lieutenant John R. Sutherland resigns his commission, dated July 29, 1914.

The undermentioned to be Lieutenants: John Livingstone, F.R.C.S.Edin., dated May 23, 1914; Maurice Cameron Anderson and James Colville Scott, M.D., dated June 11, 1914.

SUPERNUMERARY FOR SERVICE WITH THE OFFICERS TRAINING CORPS.

Lieutenant Patrick Nicol, M.B., serving with the Aberdeen University Contingent, Senior Division, Officers Training Corps, resigns his commission, dated July 4, 1914.

TERRITORIAL FORCE RESERVE.

ROYAL ARMY MEDICAL CORPS.

Major Walter M. Hamilton, M.D., Retired List, Territorial Force (late Major, List of Officers attached to Units other than Medical Units), to be Major, dated July 18, 1914.

Captain Francis R. M. Heggs, from the Notts and Derby Mounted Brigade Field Ambulance, to be Captain, dated July 25, 1914.

QUEEN ALEXANDRA'S IMPERIAL MILITARY NURSING SERVICE.

Postings and Transfers.—Sisters: Miss M. B. Williams, to London, from Aldershot; Miss M. E. Medforth, to Aldershot, from Egypt; Miss J. H. Congleton, to London, from Malta. Staff Nurses: Miss K. F. G. Skinner, to Khartoum, from Cairo; Miss E. K. Woollett, to Woolwich, on provisional appointment; Miss M. K. Barclay, to Aldershot, on provisional appointment; Miss G. W. Chamberlain, to London, on provisional appointment; Miss R. C. S. Carlton, to Devonport, from Woolwich; Miss E. M. Moore, to Dublin, from Aldershot; Miss V. L. W. Bird, to Tidworth, from London; Miss A. G. Dempster, to Colchester, from Netley; Miss K. M. Mathews, to Netley, from Curragh; Miss O. F. Stinton, to Curragh, from Netley.

Arrivals.—Miss J. H. Congleton, Sister, from Malta; Miss M. E. Medforth, Sister, from Egypt.

ROYAL ARMY MEDICAL COLLEGE.

EXAMINATION OF CAPTAINS FOR PROMOTION TO MAJOR.

List of Subjects for Essays. Tuesday, July 21, 1914. From 10 a.m. to 1 p.m. (N.B.—One subject only to be selected.)

Medical.

(1) Discuss and contrast auricular flutter and auricular fibrillation.

(2) Describe the various forms of purpura, and indicate the differential diagnosis and the line of treatment indicated in each case.

(3) Discuss and describe the cerebrospinal manifestations of syphilis, other than locomotor ataxy and general paralysis.

(4) Write an essay on acute yellow atrophy of the liver.

Tropical Medicine.

(1) Write an essay on beri-beri, paying special attention to ætiology and prevention.

(2) A British battalion was stationed in barracks near the Nile. At the end of twelve months more than thirty cases of bilharziasis had occurred in the battalion.

What is known of the life history of the parasite, the method of infection, and period of incubation?

Give your views of the prognosis and treatment of the disease, and discuss the means of prevention you would have adopted.

Surgical.

(1) Discuss the differential diagnosis, and classify the various forms of chronic inflammation of the knee-joint, which lead to the condition known as "white-swelling."

(2) State and criticize, in the light of modern pathology, the surgical treatment of aneurysm.

Medicine (Written).—Tuesday, July 21, 1914. From 2.30 to 5.30 p.m.

(1) Discuss the diagnosis of scarlet fever, and give the treatment of the more important complications.

(2) Give the clinical features, differential diagnosis, and treatment of pernicious anæmia.

(3) Describe the symptoms of duodenal ulcer; discuss the diagnosis and treatment.

(4) What are the causes of profuse hæmoptysis? Describe the treatment.

(5) Describe the symptoms and signs found in a well-marked case of sprue. Outline a course of treatment.

Surgery.—(Written.) Wednesday, July 22, 1914. From 10 a.m. to 1 p.m.

(1) Describe the semilunar cartilages of the knee-joint, and the injuries to which they are liable. Discuss the differential diagnosis of these conditions.

(2) What are the causes of vesical hæmaturia? Give the differential diagnosis between them, and the treatment you would adopt.

(3) Discuss the causes and symptoms of the different forms of fracture of the astragalus; give the appropriate treatment.

(4) Discuss the pathology and treatment of acute traumatic tetanus.

Military Surgery, and Refraction and Skiagraphy.—(Written.) (As part of the Examination in Surgery.) Wednesday, July 22, 1914. From 2.30 to 5.30 p.m.

Military Surgery.

(1) Give the varieties, symptoms, after results and treatment of small-bore gunshot injury of the median nerve.

(2) Describe the possible injuries to the bones of the forearm by a small-bore bullet at medium range. Mention the more important complications and describe fully the treatment.

Skiagraphy.

(3) In a case of obscure injury to the elbow joint, how would you obtain the fullest information by means of skiagraphy?

(4) Describe the essential parts of which an X-ray coil is built up. What is the function of the condenser?

Refraction.

(5) Give shortly the causation, symptoms and treatment of hypermetropia, and state how this condition may effect the efficiency of a soldier.

ROYAL ARMY MEDICAL CORPS FUND.

PROCEEDINGS OF A COMMITTEE MEETING HELD AT THE WAR OFFICE ON TUESDAY, JULY 14, 1914.

Present.

Surgeon-General Sir A. T. Sloggett, C.B., C.M.G., K.H.S., Chairman, in the Chair.
Surgeon-General W. G. Macpherson, C.M.G., K.H.P.
Colonel B. Skinner, M.V.O.
Colonel A. Peterkin.
Lieutenant-Colonel W. W. Pope.
Lieutenant-Colonel E. M. Pilcher, D.S.O.
Major W. Blackwell.
Captain W. Benson.
Captain F. Crookes.

(1) Letters of apology for absence were read from Colonels C. H. Lynden Bell and E. Butt.

The minutes of the last meeting were read and confirmed.

(2) The Aldershot band accounts were considered and passed; they are appended to these proceedings. A sum of £110 was sanctioned for the current quarter's band expenses.

Captain Benson, the band president, pointed out the great difficulty of retaining men in the band as so many go to the reserve on completion of three years' service. He therefore proposed the following resolution, which was seconded by Lieutenant-Colonel Pope and carried:—

"In view of the difficulty of retaining men in the band and of getting them to extend their service to seven years, with the object of remaining in the band, that an increased scale of band pay be approved, viz., not to exceed £1 a day, exclusive of the bandmaster's pay, which, it is hoped, will have the effect of greatly improving the band."

(3) It was noted that the following amounts have been received from companies for the General Relief Fund during the past quarter:—

	£	s.	d.
No. 35 Company, London	5	0	0
West Lancashire Field Ambulance	1	1	6
	£6	1	6

(4) A sum of £40 was sanctioned from the General Relief Fund for grants made during the quarter ending June 30, 1914. A list of recipients is attached hereto.

(5) A letter was read from the Scottish Naval and Military Veterans' Residence asking for a donation. It was regretted that the Committee could not accede to the request.

(6) The Committee considered a resolution of the Annual General Meeting referring the question of contributing towards the cost of the publication of the valuable compilation of "A roll of officers of the Medical Service of the Army from the commencement of the reign of George II until the formation of the Royal Army Medical Corps," made by Colonel Johnston, C.B.

After considerable discussion it was resolved to defer a decision until the next meeting with a view of ascertaining in the meantime the cost of publication and the sale price of the book.

(7) With reference to Minute 12 of the Committee of January, 1914, and Minute 12 of the Committee of April, 1914, a letter was re-read from the Secretary of the Central Mess and Games Committee asking this Committee to reconsider their decision with regard to contributing a grant of £25 from the Royal Army Medical Corps Fund towards the subscription of the Corps to the Army Athletic Association.

It appeared that the total subscription of the Royal Army Medical Corps to the Army Athletic Association is estimated to amount to £26 16s. 3d. (exclusive of officers) based on the rate of 15s. per 100 strength.

The £26 16s. 3d. the Games Committee suggested should be raised as follows:—

(*a*) A sum, say £25 if authority can be obtained, from the Royal Army Medical Corps Fund.

(*b*) Contributions from the various Royal Army Medical Corps companies stationed at home.

Nineteen of the twenty-six home companies have expressed their willingness to subscribe.

It was pointed out that any recommendation made by this committee would have to be submitted to the next Annual General Meeting for sanction, as this committee could only deal with finance as regards dinner, band, and memorials. After considerable discussion it was decided that the question should be postponed to the next meeting. In the meantime the Secretary was requested to ascertain from the Secretary of the Games Committee what amount the nineteen companies proposed to subscribe.

(8) *Memorials.*—A sum of 15s. was sanctioned for a plate to be placed on the portrait of Surgeon-General Sir Launcelotte Gubbins, K.C.B., M.V.O., late Director-General A.M.S.

(9) It was decided to purchase a print of David Maclagan, late Assistant Surgeon to the 91st Foot, for 18s.

F. W. H. Davie Harris, *Lieutenant-Colonel, Secretary.*

124, *Victoria Street, S.W.*
July 14, 1914.

THE ROYAL ARMY MEDICAL CORPS BAND, LONDON ACCOUNT.

Statement of Accounts for Quarter ending June 30, 1914.

Receipts.

	£	s.	d.
By Balance Credit	3	1	2
,, Subscriptions, Officers, Aldershot	16	15	0
,, Quarterly Grant, R.A.M.C. Fund	100	0	0
,, Thirty-one Subscriptions at 5s. (May)	7	15	0
,, Cheque London Mess, Band Expenses	10	16	8
,, ,, Marlow Regatta	20	0	0
	£158	7	10

Expenditure.

	£	s.	d.
To Band Pay and Bandmaster's Salary	76	1	11
,, Cost of Four Violin Bows, J. Tubb	4	10	0
,, Electric Light Account	1	0	4
,, Phœnix Insurance	2	2	9
,, Master-Tailor	3	11	10
,, Boosey, Music and Repairs	15	11	4
,, George Asch, Music	3	0	0
,, Hawkes' Account	6	0	0
,, Recoverable Band Expenses and Fares, London and Netley	19	3	4
,, Payment Expenses and Band Fee, Marlow	20	0	0
,, Postage Bank	0	1	0
,, Credit Balance	7	5	4
	£158	7	10

Audited and found correct (*Signed*) H. A. HINGE, *Major, R.A.M.C., President.*
J. S. BOSTOCK, *Major, R.A.M.C.* } *Members.*
R. P. LEWIS, *Captain, R.A.M.C.* }

Estimate for Quarter ending September 30, 1914.

	£	s.	d.
Carried over	7	5	4
By Aldershot Subscriptions	15	0	0
Probable grant required	107	14	8
	£130	0	0

	£	s.	d.
To Estimated Expenditure under all heads	130	0	0
,, Debit at Bank	0	0	0
	£130	0	0

(*Signed*) WALLACE BENSON, *Captain R.A.M.C.,*
Band President.

ROYAL ARMY MEDICAL CORPS FUND.

LIST OF RECIPIENTS OF GENERAL RELIEF FOR THE QUARTER ENDING JUNE 14, 1914.

Name	Age	District	Grant	Total	Remarks
Mr. J. S.	46	Dover	£3	£6	Suffers from ill-health.
Mr. J. H.	45	Chester	4	4	Unable to work from ill-health.
Mrs. A. M.	30	Tidworth	4	8	Destitution. Four children.
Mrs. J. F.	49	Dublin	2	2	Ill-health and destitution.
Mr. P. H.	32	York	3	3	Destitution.
Mrs. M. P.	39	,,	4	4	Destitution.
Mrs. L. L. L.	34	Gibraltar	4	4	Destitution.
Mrs. J. L. G.	39	Dublin	3	3	Destitution.
Mr. W. N.	57	Woolwich	2	15	Out of work and ill-health.
Mr. I. H.	33	Dublin	2	6	Destitution.
Mrs. A. C.	36	Woolwich	3	7	Destitution.
Mr. A. H. K.	43	,,	2	2	Ill-health.
Hilda McD.	14	Portsmouth	4	12	Committee April, 1913.

ROYAL ARMY MEDICAL CORPS OFFICERS' BENEVOLENT SOCIETY.

PROCEEDINGS OF A COMMITTEE MEETING HELD AT THE WAR OFFICE ON TUESDAY, JULY 14, 1914.

Present.

Surgeon-General Sir A. T. Sloggett, C.B., C.M.G., K.H.S., President, in the Chair.

Surgeon-General W. Donovan, C.B.

Colonel B. Skinner, M.V.O.

Lieutenant-Colonel E. M. Wilson, C.B., C.M.G., D.S.O.

Lieutenant-Colonel A. B. Cottell.

Lieutenant-Colonel E. M. Pilcher, D.S.O.

Major E. T. F. Birrell.

The minutes of the last meeting were read and confirmed.

A special grant made to the orphan of Major I. of £9 18s. 4d. was approved.

It was decided under Rule 10 to purchase £150 of Consols out of the surplus receipts for the past year.

F. W. H. DAVIE HARRIS, *Lieutenant-Colonel,*
Secretary.

124, *Victoria Street, S.W.*
July 14.

ROYAL ARMY MEDICAL CORPS CENTRAL MESS FUND.

THE following resolutions, adopted at the Annual General Meeting of officers of the Corps on June 15, 1914, are published again for general information. Up to the present date subscribers to the Fund number 840. More than 200 officers have not yet subscribed. Of these 70 in the early part of last year expressed their willingness to subscribe, but have not yet done so. The Hon. Secretary will be glad to send bankers' orders to any whose earlier copies may have miscarried.

(*a*) All officers joining the Corps after March 1, 1914, may become subscribers to the Central Mess Fund by paying an entrance fee of £5 5s., and thereafter an annual subscription equivalent to one-half of one day's pay of their rank and service, at British rates, on March 1, on which date their subscriptions shall be due in advance. The entrance fee to be paid during the first three months of an officer's service, either in one sum or by equal monthly instalments.

(The above proposal is based on the fact that at present a young officer pays £2 on joining the London Mess, £2 16s. at Aldershot, and afterwards joining contributions to other messes at home and abroad.)

(*b*) All other officers on the active, half-pay, and retired lists shall become members on payment of the above-mentioned annual subscription only.

(This is a restatement, for the sake of clearness, of resolutions adopted at the Annual General Meetings in 1912 and 1913. With reference to the latter it may be mentioned that the resolution was worded, "That officers on the retired and half-pay lists be eligible to subscribe to the Fund, and that their annual subscription be at the rate of one-half of one day's retired or half-pay of their rank. That established messes be invited to accord the privilege of honorary membership to such subscribers.")

(*c*) In future quartermasters be considered honorary members of the Central Mess Fund without payment of an annual subscription.

(*d*) Officers subscribing as above and the honorary members there mentioned be relieved of all joining contributions to messes (including those paid on promotion), the payment of such to be a charge on the Central Mess Fund.

(*e*) The above payments from the Central Fund take place, retrospectively, as from March 1, 1914. Such joining contributions as may have been paid to messes between that date and the adoption of these resolutions will be refunded to subscribers, through the honorary secretaries of the various messes.

(Members of the present class of lieutenants (on probation) who have not paid the above entrance fee will be relieved of joining contributions in future, other than that now payable to the Aldershot mess.)

(*f*) As a tentative measure, such payments from the Central Fund be made quarterly on requisition by the honorary secretaries of the various messes.

(*g*) No increase in the rates of joining contributions to messes existing on March 1, 1914, be made without reference to the Central Mess Committee.

(*h*) The case of messes which impose no joining contributions be specially considered.

With reference to (*e*) the Hon. Secretary would be grateful if such mess secretaries as have not already done so would send him a statement of the refunds claimed through them as soon as possible. Requisitions under (*f*) for the first quarterly payment to messes from the Central Fund should be sent in at the end of September.

Retired Officers and the Central Mess Fund.

Attention is invited to the discussion which took place on the above subject at the Annual General Meeting on June 15, which will be found in the Corps News for July, pp. 22, 23. The Director-General closed it by saying that he thought the meeting would agree with him that everything should be done to strengthen the links which already existed between past and present officers of the Corps, and felt sure that retired officers would be received by all messes with open arms. He would therefore direct the hon. secretary to write to the various messes informing them of the feeling of the meeting, and inviting their co-operation in the matter.

In response to the above the following replies have, so far, been received:—

"R.A.M.C. Mess,
"Grosvenor Road, S.W.
"*July* 13, 1914.

"Dear Sir,—I am in receipt of your letter and enclosure of the 13th inst., and in reply beg to state that this mess will be very pleased to extend its honorary membership to all retired officers who are subscribers to the Central Mess Fund. It would be of great assistance if the names of retired officers who subscribe to this Fund were published in the Corps Journal from time to time.

"Believe me,
"Yours very truly,
"F. S. Irvine,
"*Major R.A.M.C.*,
"*Mess Secretary*.

"The Hon. Secretary,
"R.A.M.C. Central Mess Fund."

"R.A.M.C. Mess,
"Curragh Camp,
"Co. Kildare,
"*July* 16, 1914.

"Dear Sir,—Your letter to hand, dated July 12, *re* making retired officers honorary members of messes. I am directed by the members of this mess to say that all retired officers R.A.M.C. are welcomed as honorary members. It has always been the custom here to make retired officers R.A.M.C., living in the vicinity, or coming to the Curragh on a visit, honorary members of this mess. It would be a help to mess

secretaries to have the names of retired officers who subscribe to the Central Mess Fund published in the JOURNAL from time to time.

"Yours faithfully,
"F. L. BRADISH,
"*Captain R.A.M.C.*,
"*P.M.C.*"

The Hon. Secretary will be glad to forward bankers' orders to any retired officers who may desire them. Such officers are particularly requested not to send their subscriptions to him, but direct to Messrs. Holt and Co., for credit to the Fund.

The following retired officers have subscribed:—

Colonel H. W. Murray.

Lieutenant-Colonel E. M. Wilson, C.B., C.M.G., D.S.O.

J. T. CLAPHAM, *Captain*,
Hon. Secretary.

3, *Homefield Road*,
Wimbledon, S.W.
July 20, 1914.

NOTES ON GAMES AND SPORTS.

CRICKET.—Our Aldershot correspondent writes:—"Since the appearance of the last notes from here in the JOURNAL of June, the Corps cricket has been sadly interfered with by various circumstances. We have never been able to put in the field our best side, and only on very few occasions anything approaching our best side, with the result that the side has been thoroughly disorganized, instead of being a unit, each member of which thoroughly understood the play of every other, and working with that cohesion and esprit de corps without which constant success can come to no side. We have been a collection of stray individuals, most of them collected as best one could at the last moment. The results call for but little comment. Since the last notes appeared we have played sixteen matches, winning eight and losing seven; the remaining match being drawn, another five minutes would have converted it into a victory.

"We have played the Army Service Corps twice, and were beaten each time, our batting cracking up on both occasions in a most unaccountable manner. In the first match we got them out on an easy wicket for 93, and could only reply with 76. On the second occasion we sent them back for 134 after they had 80 up for 1 wicket, and again could only respond with 77. The Berkshires, in their second match against us, fielded a full side, but we could only raise a very weak one. They went in first, and after making 170 odd for 5 wickets, declared, and in their turn 'outed' us for 52, Colour-Serjeant Forster, who played for Hampshire a few years back, and has played for the Command regularly this year, taking all 10 wickets for 9 runs. The wicket helped him a great deal, but all the same he bowled finely against some very poor batting.

"Few of the Corps team have represented the Command at different times this year, and Major H. B. Fawcus played for the Army against both Cambridge University and the Navy. He did not meet with much success with the ball in either match, but in the first innings of the former he made a very excellent 56, which was top score of the innings and came at a time when runs were very badly needed."

LAWN TENNIS.—The Army Lawn Tennis Tournament took place at Queen's Club, London, on July 8, 9, 10, 11.

The Corps was fairly well represented, five entries in the Singles Championship and three pairs in the Doubles Championship. Four pairs actually entered but, unfortunately, the Aldershot pair (Major G. A. Moore and Captain Benson) had to scratch at the last moment. Major H. G. Pinches (Dover) reached the Final of the Championship Singles where he met the holder, Major Young of the Devons. Although suffering from a painful "tennis" elbow, Major Pinches put up a good fight before accepting defeat. This is the first time that a Corps representative has contested the Final of the Army Singles. The pairs entered for the Doubles Championship were:—

Majors B. B. Burke and H. G. Pinches (Dover District).

Major P. H. Henderson and Captain Sylvester Bradley (Southern Command).

Captain H. T. Wilson and Captain O'Grady (Chatham).

It was unfortunate that the luck of the draw brought our strongest pairs, Burke and Pinches, and Henderson and Bradley, against each other in the second round. Henderson and Bradley showed themselves to be a good combination and made the more fancied pair go all the way to win; the team work of the losers was good. In the semi-final round Burke and Pinches met Majors Young and Harris (Devons) and were

defeated 6—4, 6—4. The tennis in this match reached a high standard and our pair, although severely handicapped by Pinches' injury and consequent "overhead" weakness, were unlucky to lose the second set in which they held a lead of 4—1 and 40—love in their service.

GOLF.—"*Army Golf Meeting.* The annual meeting will be held on the links of the Royal and Ancient Golf Club, St. Andrews, on Tuesday, October 13, and following days.

"*The Army Championship.*—(First Day, Tuesday, October 13). Any Officer serving in the Regular Army is eligible to compete. Entrance fee 5s.

"(*a*) 36 Holes Medal Play Competition Scratch Score for Championship Cup. The winner to hold the title of Army Champion for the year.

"(*b*) 36 Holes Medal Play Competition under handicap for first and second prizes. There will also be a prize for the best score under handicap for the last 9 holes of the second round.

"N.B.—(1) The entrance fee of 5s. entitles a competitor to enter for either or both of the above competitions.

"(2) Competitors must notify the Hon. Secretary when entering of their lowest Club Handicap.

"(3) Competitors must name their partners when entering. Anyone requiring a partner must notify the Hon. Secretary.

"(4) Starting times will be drawn for and a starting list posted in the Club House at 6.30 p.m., on Monday, October 12.

"(5) There will be optional sweepstakes on each event.

"(6) The members of the Royal and Ancient Golf Club have kindly made all competitors honorary members from Monday, October 12, till the end of the meeting inclusive.

"(7) Railway tickets at reduced rates will be available. Competitors should apply to the Hon. Secretary for vouchers when entering.

"*Army Golf Challenge Cup.*—(Second Day, Wednesday, October 14.)

"(1) Each team to consist of four Officers of a Unit of the Regular Army.

"(2) The Cup to be played for on the 'Knock-out Tournament System,' scoring by holes. Eighteen holes will be played in each Round except the Final, which will be 36 holes. In the event of a tie each member of the two teams will play the 19th hole and so on until a hole is won.

"(3) Entrance fee £1.

"(4) Medals will be presented to the winners by the President.

"(5) The Cup can never be won outright.

"All entries, with entrance fees, must reach the Hon. Secretary by Saturday, October 3.

"The Annual General Meeting will take place at 5 p.m. on October 13.

"(*Signed*) H. L. F. NICHOLLS, *Hon. Secretary*
"(5th Fusiliers)
"(Address for Entries) *Broomhayes,*
"*Northam, N. Devon.*"

The following scheme of units for entry of Royal Army Medical Corps teams for Army Golf Challenge Cup was approved by the Army Golf Committee last year, and will take effect at the meeting in October:—

Unit (1) Aldershot Command.
,, (2) War Office, London District, and Staff, Royal Army Medical College.
,, (3) Eastern Command Headquarters, Woolwich and Colchester Districts.
,, (4) Dover and Chatham Districts.
,, (5) Southern Command Headquarters, Tidworth and Plymouth Districts.
,, (6) Portsmouth District, Netley, Channel Islands.
,, (7) Western, Northern and Scottish Commands.
,, (8) Irish Command Headquarters, Dublin District.
,, (9) Cork and Belfast Districts.
,, (10) Captains' Class, Royal Army Medical College.

RACING.—Captain O'Brien Butler won the Visitors' Plate at the Curragh on Cindery, and dead-heated for the Holiday Hurdle Race at Baldoyle on Tickler. At the Bibury Club meeting at Salisbury, he won the Wallop Selling Race on Dabber, and the Bibury Stakes on Ashore, the latter race for the second year in succession.

J. T. CLAPHAM, *Captain,*
Hon. Secretary R.A.M.C. Games Committee.

3, *Homefield Road,*
Wimbledon.
July 20, 1914.

ARMY MEDICAL OFFICERS' WIDOWS' AND ORPHANS FUND.

THE Committee of the Army Medical Officers' Widows and Orphans Fund wishes to bring to the notice of officers of the Corps the benefits offered by this Society; and to draw attention to its strong financial position, as disclosed by the Actuary's Report on the recent quinquennial valuation of the Fund. In this report (a copy of which may be obtained from the Secretary) the Actuary states that "the financial position of the Society continues to be eminently satisfactory," and adds that from the Fund officers can obtain "at least a minimum provision for their widows and orphans at a much lower cost than from any Life Assurance Company or other Society."

The annual subscription of a married member provides an annuity of £50, during widowhood, to the widow of the marriage, during which his subscription as a married member began. In the event of the death of the widow this annuity is continued to the children of such marriage until the youngest attains the age of 21 years. It also continues for their benefit, up to the same age, if the widow re-marries. Furthermore, should the wife of the subscriber predecease him, it will be optional for him to continue the subscription he had been paying as a married member, in order to provide an annuity similar to the above for the children of the marriage, until the youngest shall have attained the age of 21 years.

Provision is also made (Rule X) whereby a part of the surplus at any quinquennial valuation may be applied for the benefit of members, or their wives, or orphan children. Thus, at the valuation as at December 31, 1910, a portion of the surplus was appropriated to bring the £50 annuities, immediate and contingent, in respect of members, married and unmarried, on the books at December 31, 1910, up to the present statutory limit of £52 per annum; and also to provide a sum of £100 (in addition to the first half-yearly annuity payment) immediately on the death of every first-class married member on the books at December 31, 1910, should he predecease his present wife.

There is every reason to presume that at the next quinquennial valuation similar additional benefits may be granted to members now joining.

Unmarried officers may become members by paying £2 yearly, and can thus reduce the rate of their subscriptions when married. They are eligible to share in such distribution of surplus as may from time to time take place under Rule X, and at the last distribution did so benefit. They also safeguard themselves against the possible closure of the Fund in war time, mentioned below.

A tables of the rates of subscription will be found at the end of the Book of Rules, at which rates some examples are given below:—

Husband's age	Wife's age	Annual subscriptions £	s.	d.
25	20	13	8	5
28	32	11	18	2
30	27	14	6	1
32	28	15	5	9
33	33	14	5	10
35	25	18	9	1
36	33	16	17	2
38	28	19	19	6
42	38	19	6	8
46	40	21	12	6
50	45	24	9	5
50	50	20	11	1
55	50	27	19	6

These terms cover all war and climate risks, and there are no marriage fines. But on the imminence or outbreak of war the Committee are empowered to close the Fund temporarily to applicants for membership, or to admit them at special war rate.

Copies of the Rules, Actuary's Report, Annual Report, and Balance Sheet, together with Declaration Forms, can be obtained from the Secretary, who will be glad to give any other information in his power.

J. T. CLAPHAM, *Captain.*
Secretary.

3, *Homefield Road,*
Wimbledon, S.W.

THE QUARTERLY MEETING OF THE COMMITTEE WAS HELD AT THE WAR OFFICE ON WEDNESDAY, JULY 22, 1914.

Present.

Surgeon-General Sir Arthur Sloggett, C.B., C.M.G., K.H.S., President, in the chair.
Surgeon-General W. S. M. Price, Vice-President.
Deputy-Surgeon-General W. G. Don, Vice-President.
Surgeon-General Sir Charles Cuffe, K.C.B.
Surgeon-General H. R. Whitehead, C.B.
Colonel W. H. Horrocks.
Lieutenant-Colonel A. F. S. Clarke.
Lieutenant-Colonel M. P. Holt, D.S.O.
Major E. T. F. Birrell.
Major R. H. S. Fuhr, D.S.O.

(1) The Minutes of the previous meeting were read and confirmed.

(2) The following were admitted members of the Society: Captain D. Ahern, unmarried member; Captain A. C. Elliott, married member; Captain J. E. Ellcome, married member (subject to receipt of subscription). The election of Captain C. H. O'Rourke, a provisional member, was confirmed.

(3) A certificate was submitted from the Actuary that the marketable securities of the Society were Trustee Securities on June 30, 1914.

(4) A letter was submitted from Lieutenant-Colonel J. Stevenson, a Trustee, in which he acknowledges having received from the Secretary a renewed premium receipt for the latter's agreement in £500 with the guarantee society,

(5) The Secretary reported that circulars had been sent to all members inviting their opinion on the question of altering the rules to admit of members whose subscriptions exceeded £10, having the option of paying them by half-yearly instalments. Of the sixty-six replies received so far, sixty were in favour of this proposal.

(6) Payment of the Secretary's salary and office allowance for the quarter ended June 30, was sanctioned, as was the refund to him of petty cash expended.

(7) The Secretary was granted leave of absence on the understanding that the affairs of the Society do not suffer thereby.

(8) The Secretary informed the Committee that owing to change of tenants, he was unable to retain his office at 20, Belgrave Road. His removal to the undermentioned address was approved.

(9) The proceedings closed with a vote of thanks to the Chairman.

3, *Homefield Road,*
Wimbledon, S.W.
(Telephone 750 Wimbledon). *July* 23, 1914.

J. T. CLAPHAM, *Captain,*
Secretary.

WARRANT OFFICERS' AND SERJEANTS', PAST AND PRESENT, ANNUAL DINNER CLUB.

THE committee of the warrant officers' and serjeants', past and present, annual dinner club desire to bring the club more prominently before the view of serving warrant officers and serjeants and if possible to enlarge its scope.

The chief object of the club is to bring together annually as many members as possible, in order that old friendships may be renewed and new acquaintances formed.

Although the numbers present at the annual dinner in London have steadily increased since the club was formed in 1909, the financial position is not all that was anticipated, the balance credit this year after clearing off all liabilities being only 18s. 11d. This is apparently chiefly due to three reasons:—

(1) The heavy expenditure necessary to collect members' subscriptions.

(2) The loss, approximately £15, due by members failing to contribute their annual subscriptions.

(3) The lack of that sympathy with the objects of the club which, it was hoped, would have gathered in every serjeant (and upwards), and which is pre-eminently necessary to place such a club on a sound financial basis.

No doubt there are other reasons which have prevented individuals from becoming members, but these are not applicable to the majority.

It is now considered necessary to make an endeavour to present this club and its possibilities more clearly to the present serving warrant officers and serjeants, in the hope that it will be supported by every eligible person in the Corps.

Correspondence on the subject of the club is invited, and should be addressed to the Hon. Sec., Royal Herbert Hospital, Woolwich.

ROYAL ARMY MEDICAL COLLEGE.

LIST OF BOOKS ADDED TO THE LIBRARY DURING THE MONTHS OF APRIL, MAY, AND JUNE, 1914.

Title of Work and Author	Edition	Date	How obtained
Memories of Seven Campaigns. By James Howard Thornton, C.B.		1895	Library Grant.
With the Red Cross in the Franco-German War, 1870-71. By Henry Randle, F.R.C.S.		1910	,, ,,
The Life of Florence Nightingale. By Sir Edward Cook. 2 Vols.		1914	,, ..
The Principles of War Historically Illustrated. By Major-General E. A. Altham, C.B., C.M.G. vol. i, with Maps		1914	,, ,,
The Nation in Arms. By Baron Colmar Von der Goltz. Translated by P. A. Ashworth		1913	,, ,,
The Theory and Practice of Heating and Ventilation. By A. H. Barker, B.Sc., B.A.		1912	,, ,,
A Treatise on Quantitative Inorganic Analysis. By J. W. Mellor, D.Sc.		1914	,, ,,
A Handbook of Hygiene. By A. M. Davies and C. H. Melville	4th	1913	,, ,,
Diseases and Injuries of the Eye. By William George Sym, M.D.		1913	,, ,,
Studies in Water Supply. By A. C. Houston, D.Sc.		1913	,, ,,
A Handbook of Skin Diseases and their Treatment. By A. Whitfield, M.D.		1907	,, ,,
Malaria: Etiology, Pathology, Diagnosis, Prophylaxis, and Treatment. By G. E. Henson, M.D.		1913	,, ,,
Flies in Relation to Disease. Non-Bloodsucking Flies. By G. S. Graham-Smith, M.D.		1913	,, ,,
A Manual of Medical Treatment or Clinical Therapeutics. By I. Burney Yeo, M.D. Revised by R. Crawfurd, M.D., and E. F. Buzzard, M.D. 2 Vols.	5th	1913	,, ,,
More Secret Remedies, what they cost and what they contain		1912	,, ,,
The Dictionary of Photography. By E. J. Wall. Edited by F. J. Mortimer	9th	1912	,, ,,
Physiology and Pathology of the Urine. By J. Dixon Mann, M.D.	2nd	1913	,, ,,
Surgical Experiences in South Africa, 1899-1900. By G. H. Makins, C.B.	2nd	1913	,, ,,
Methods used in the Examination of Milk and Dairy Products. By Dr. C. Barthel. Translated by W. Goodwin		1910	,, ,,
Dysenteries: Their Differentiation and Treatment. By Leonard Rogers, M.D.		1913	,, ,,
A Manual of Operative Surgery, with Surgical Anatomy and Surface Markings. By Dr. C. L. Fitzwilliams, M.D.		1913	,, ,,
A Manual of Midwifery. By I. W. Eden, M.D. ..	3rd	1911	,, ,,
Field Service Notes for R.A.M.C. By Major T. H. Goodwin, R.A.M.C.		1913	,, ,,
Disinfection and Disinfectants. By M. Christian. Translated by C. Salter		1913	,, ,,
Index to the Proceedings of the Royal Society of London. (Old Series), Vols. i-lxxv, 1800-1905		1913	,, ,,
Surgical Diseases and Injuries of the Genito-Urinary Organs. By J. W. S. Walker, M.B., C.M.		1914	,, ,,

LIST OF BOOKS ADDED TO THE LIBRARY—*Continued.*

Title of Work and Author	Edition	Date	How obtained
A Dictionary of Treatment. By Sir William Whitla, M.A., M.D.	5th	1912	Library Grant.
Quain's Elements of Anatomy. Vol. ii, Part I. Microscopic Anatomy. By E. A. Schäfer	11th	1912	,, ,,
The Blood: A Guide to its Examination and to the Diagnosis and Treatment of its Diseases. By G. L. Gulland, M.D., and A. Goodall, M.D.		1912	,, ,,
Gray's Anatomy. Edited by R. Howden, M.A., M.B.	18th	1913	,, ,,
A Manual of Practical Chemistry for Public Health Students. By A. W. Stewart, D.Sc.		1913	,, ,,
The Respiratory Function of the Blood. By Joseph Barcroft, F.R.S.		1914	,, ,,
A Dictionary of Applied Chemistry. By Sir E. Thorpe, C.B., F.R.S. 5 vols.		1912-13	,, ,,
Thacker's Medical Directory of India, Burma, and Ceylon			
Journal d'un Chirurgien de la Grande Armée. (L. V. Lagneau), 1803-1815. Edited by Eugène Tattet		1913	,, ,,
Souvenirs d'un Chirurgien d'Ambulance, 1870. Par Dr. Léon Morgnac		1912	,, ,,
Blood-pressure from the Clinical Standpoint. By F. A. Faught		1914	,, ,,
Die Sanitarsch-Pathologische Bedetung der Insekten. Von Prof. Dr. E. A. Goldé		1913	,, ,,
Genèse des Matières Protèiques et des Matièrses Humiques. Par C. Maillard		1913	,, ,,
Physiologie des Menchenwachstums. Von Dr. H. Friedenthal		1914	,, ,,
Lehrbuch der Physiologischen Chemie. i Teil. Von Prof. Dr. E. Abderhalden		1914	,, ,,
A Text-Book on Gonorrhœa and its Complications. By Dr. Georges Luys. Translated and edited by Arthur Foerster		1913	Editor, Journal.
Beri-Beri. By E. B. Vedder, A.M., M.D.		1913	,, ,,
Formulaire de Thérapeutique Clinique. Par le Dr. L. Pron	2nd	1914	,, ,,
Die Moderne Therapie der Gonorrhöe beim Manne. Von Dr. Paul Asch		1914	,, ,,
Zanzibar Government. Public Health Department: Annual Report		1912	,, ,,
Annual Report of the Surgeon-General of the Public Health Service of the United States for the fiscal year 1913		1914	,, ,,
Guide to Promotion for Officers in Subject (a), (i) (Regimental duties). By Major R. Legge	5th	1914	,, ,,
First Aid in the Royal Navy		1913	,, ,,
Outlines of Greek and Roman Medicine. By James Sands Elliott, M.D.		1914	,, ,,
The Fæces of Children and Adults. By P. J. Cammidge, M.D.		1914	,, ,,
Forschungen über das Auftreten das Typhus recurrens in Schweden und Seine Atiologischen momente Hauptsächlich bei der Marine, 1778-1790. Von O. T. Hult		1914	,, ,,
The Medical Annual		1914	,, ,,

LIST OF BOOKS ADDED TO THE LIBRARY—*Continued.*

Title of Work and Author	Edition	Date	How obtained
Dental Diseases in Relation to Public Health. By J. Sim Wallace, M.D.		1914	Editor, Journal.
The Medical Department of the United States Army in the Civil War. By Capt. Louis C. Duncan, Medical Corps, United States Army		1914	,, ,,
Index-Catalogue of the Library of the Surgeon-General's Office, United States Army. Authors and Subjects. Second series. Vol. xviii		1913	Surgeon-General United States Army.
Report on the Examination of Officers for Promotion, held in December, 1913		1914	Commandant's Office.
Annual Report of the Sanitary Commissioner with the Government of India for 1912. With Appendices		1914	,, ,,
Seventeenth International Congress of Medicine (London), 1913. General volume		1914	,, ,,
Section 20. Naval and Military Medicine, Parts 1 and 2		1914	,, ,,
Verroffentlichungen des Osterreichischen Zentral-Komitees zur Bekampfung der Tuberkulose (Report of the Austrian Central Committee on Tuberculosis)		1914	War Office.
Paul Ehrlich. Eine Darstellung Seines Wissenschaftlichen wirkens		1914	Presented by Sir W. L. Gubbins, K.C.B.
Dairies and Cowsheds. By Quartermaster-Serjeant E. B. Dewberry, R.A.M.C.		1914	Presented by the Author.
On the late Results of three Cases of Transplantation of the Fibula. By C. J. Bond, F.R.C.S. Reprinted from the *British Journal of Surgery*, Vol. i		1914	,, ,,
Memoir of Sir Andrew Smith, M.D., K.C.B., F.R.S., etc., Director-General of the Medical Department of the British Army. By Alexander Mickie		1877	Presented by Col. W. Johnston, C.B., LL.D., M.D.
Army Hygiene. By C. A. Gordon, M.D., C.B. ..		1866	,, ,,
Biographical Sketch of the late John Alexander Schetky, Deputy Inspector-General of Hospitals		No date	,, ,,
Our Trip to Burmah, with Notes on that Country. By Surgeon-General C. A. Gordon, M.D., C.B.		,,	,, ,,
Diary of the Crimean War. By Frederick Robinson, M.D. Two copies		1856	One copy presented by Col. W. Johnston, C.B., the other by Maj. M. H. G. Fell, R.A.M.C.
Un Souvenir de Solferino. Par J. Henry Durrant. First Edition Copy		1862	Presented by Major M. H. G. Fell, R.A. M.C.
Memoirs of a French Serjeant. By Robert Guillemard	No title page		,, ,,
A Packet of Official and other Letters written by Inspector-General William Ferguson, during the Peninsular War			Presented by Dr. A. Chaplin, 3, York Gate, N.W.
Hospital Journal taken by the late Sir George Macleod, from the General Hospital at Sebastopol			Presented by Sir G. T. Beatson, 7, Woodside Crescent, Glasgow.

BALANCE SHEET.

Liabilities.	£	s.	d.	Assets.	£	s.	d.	£	s.	d.
To Publishers' Bills for June Quarter, 1914	357	14	1	By Cash at Bank				447	1	1
,, Balance Credit	2,558	5	3	,, Value Stamps in Hand				1	5	3
				,, Investments at Cost—						
				India Stock	£979	8	0			
				Consols	1,198	4	9			
				Tasmanian Stock	197	15	0			
								2,375	7	9
				,, Furniture, &c., as per last Balance Sheet	23	18	1			
				Written off for depreciation ..	2	7	10			
								21	10	3
				,, Outstanding for Subscriptions				1	0	0
				,, Do. Advertisements				69	15	0
	£2,915	19	4					£2,915	19	4

TRADING ACCOUNT.

FROM JULY 1, 1913, TO JUNE 30, 1914.

EXPENDITURE.

	£	s.	d.
To Publishers' Bills—			
Journal	1,079	18	8
Corps News	205	12	1
Distribution List	35	11	0
Seniority Roll	20	6	3
Reprints	10	4	6
Envelopes, Postage and Packing	75	7	7
Sundries	1	5	0
To Messrs. Waterlow	14	5	0
,, Balance to Profit and Loss Account	320	12	10
	£1,763	2	11

RECEIPTS.

		£ s. d.	£ s. d.
By Subscriptions to Journal		1,238 16 8	
,, ,, Outstanding June 30, 1914		1 0 0	
		1,239 16 8	
Deduct Subscriptions credited in error	£6 1 0		
Deduct Subscriptions outstanding June 30, 1913	2 0 0		
		8 1 0	
			1,231 15 8
By Subscriptions to Corps News			28 1 3
,, ,, Seniority Roll			21 13 9
,, Receipts for Covers and Binding			0 1 6
,, ,, ,, Reprints		1 0 0	
Less Amount outstanding for Reprints June 30, 1913		1 0 0	
By Advertisements			287 8 9
,, Sales through Manager			1 9 4
,, ,, ,, Publisher			192 12 8
			£1,763 2 11

PROFIT AND LOSS ACCOUNT.

FROM JULY 1, 1913, TO JUNE 30, 1914.

EXPENDITURE.	£	s.	d.	£	s.	d.
To Business Manager's Account—						
Stamps	15	13	9			
Clerk to Manager	24	0	0			
,, Editor	12	12	0			
Postman	1	0	0			
Stationery..	1	0	6			
				54	6	3
To Honorarium to Editor..				100	0	0
,, ,, Assistant Editor				50	0	0
,, ,, Clerk in Record Office				6	10	0
,, ,, Auditor				2	2	0
,, Exchange on Drafts				0	1	9
,, Cheque Book				0	4	2
,, Written off for Depreciation of Furniture ..				2	7	10
,, Balance carried to Balance Sheet—						
Net Profit during the year ..	180	16	11			
Balance, July 1, 1913	2,377	8	4			
				2,558	5	3
				£2,773	17	3

RECEIPTS.	£	s.	d.
By Balance from last Account	2,377	8	4
,, Gross Profit on Trading Account	320	12	10
,, Interest on India Stock	32	19	1
,, ,, Consols	35	6	4
,, ,, Tasmania Stock	7	10	8
	£2,773	17	3

H. BARROW, *Major*, *R.A.M.C.*
Hon. Manager, *Journal R.A.M.C.*

July 1, 1914.

Examined and found correct,
EDMOND T. GANN.

July 6, 1914.

ROYAL ARMY MEDICAL COLLEGE.

A Calendar of the Royal Army Medical College will be published shortly at the price of 1s. per copy.

This Calendar contains a history of the Army Medical School from its first inception. It includes a record of the holders of professional and other appointments, and a complete list of those who have gained prizes at the school and during their subsequent service. Information is also given regarding the course of instruction. Copies can be obtained from Major Barrow at the War Office, and from the Royal Army Medical College.

OBITUARY.

BRIGADE-SURGEON CHARLES MACKINNON.

Brigade-Surgeon C. Mackinnon died at Eastbourne on July 11, 1914, aged 83. He was born at Alyghur, East Indies. He joined the Army as Assistant Surgeon, Staff, on September 28, 1857, and was appointed Assistant Surgeon of the 61st Foot in November of the same year. He served during the Indian Mutiny, 1857-8, being present at the attack near Peeroo, in the Jugdespore Jungle in May, 1858, and received the medal for his services. In May, 1861, he was again appointed Assistant-Surgeon, Staff, and in June, 1864, was transferred in the same week to the 20th Hussars. He was promoted Surgeon, Staff, in October, 1872; Surgeon-Major, Army Medical Department, March, 1873, and retired on retired pay with the honorary rank of Brigade-Surgeon in October, 1882.

MAJOR NICHOLAS MARDER.

Major N. Marder died at Exeter on July 10, 1914, aged 50. He was born at Lyme, Dorset, and received his medical education at St. Bartholomew's Hospital. He took the diplomas M.R.C.S. and L.R.C.P. in 1891. He joined the Service as Surgeon-Lieutenant, Army Medical Staff, on July 27, 1892, was promoted Surgeon-Captain in 1895, and Major, Royal Army Medical Corps, in 1895. In 1897-8 Major Marder served in the operations on the North-West Frontier of India and was present at the operation on the Samana and with the Tirah Expeditionary Force, receiving the medal with three clasps. He also served in the South African War, and was present at the operations in Natal, 1899, including the action at Talana; the defence of Ladysmith; operations in Natal, 1900; operations in Orange River Colony, August to November, 1900. He received the Queen's Medal with four clasps for his services. He retired on retired pay in 1912.

MARRIAGE.

MEADEN—MATHER.—On July 30, at St. James' Church, Dover, by the Rev. R. Alban Meaden (father of the bridegroom), assisted by the Vicar of St. James, Captain Alban Anderson Meaden, R.A.M.C., eldest son of the Rev. R. Alban Meaden, to Violet Irene Kathleen, only surviving child of Mrs. Mather and of the late John Mather, Esq., I.C.S.

DEATHS.

MACKINNON.—At Eastbourne, on July 11, 1914, Honorary Brigade-Surgeon Charles Mackinnon.

MARDER.—On July 10, 1914, at Exeter, Major Nicholas Marder, retired, R.A.M.C., aged 50.

EXCHANGES, &c.

The charge for inserting Notices respecting Exchanges in the Royal Army Medical Corps is 5/- for not more than five lines, which should be forwarded by Cheque or P.O.O., with the notice, to Messrs. G. STREET and CO., Ltd., 8, *Serle Street, London, W.C., not later than the* 22*nd of the month.*

Major, due for foreign service Trooping Season 1914-1915, wishes to exchange with an officer low down on roster. Apply "R. N.," c/o Holt & Co., 3, Whitehall Place, London.

Captain ordered India middle Trooping Season wishes exchange to colony or home; Straits Settlements excluded. Address "A. Z.," c/o Holt & Co., 3, Whitehall Place, London.

A free issue of twenty-five reprints will be made to contributors of Original Communications, and of twenty-five excerpts of Lectures, Travels, and Proceedings of the United Services Medical Society.

Any demand for excerpts, additional to the above, or for reprints, must be forwarded at the time of submission of the article for publication, and will be charged for at the following rates, and additional copies at proportionate rates:—

Number of Reprints	Number of Pages	Cost of Reprints	Cost of EXCERPTS *	Extra for Covers for Reprints: As Journal, Printed on Front	As Journal, Plain, Unprinted	Cheaper Paper, Printed on Front	Cheaper Paper, Plain, Unprinted
		£ s. d.	£ s. d.	s. d.	s. d.	s. d.	s. d.
12	4	0 2 6	0 1 0				
	8	0 4 6	0 2 0	3 6	0 11	3 2	0 7
	16	0 7 6	0 3 6				
25	4	0 3 0	0 1 3				
	8	0 5 6	0 2 6	4 0	1 3	3 6	0 9
	16	0 9 6	0 4 6				
50	4	0 4 0	0 1 8				
	8	0 6 9	0 3 2	5 0	1 9	4 0	1 0
	16	0 12 0	0 5 3				
100	4	0 5 6	0 2 9				
	8	0 9 0	0 4 4	6 6	3 3	5 6	2 0
	16	0 16 9	0 6 9				
200	4	0 8 6	0 4 0				
	8	0 13 6	0 6 0	9 0	6 3	7 6	4 0
	16	1 3 6	0 8 9				

* These are not arranged as Reprints, but appear precisely as in the Journal with any other matter that may happen to appear on the first and last pages of the particular excerpt ordered.

Cases for Binding Volumes.—Strong and useful cases for binding can be obtained from the publishers at the undermentioned rates:—

Covers, 1s. 4d. net; binding, 1s. 2d.

These charges are exclusive of cost of postage.

In forwarding parts for binding the name and address of sender should be enclosed in parcel.

Notices.

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, etc. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts, and commands at home and abroad.

Matter intended for the Corps News should reach the Editor not later than the 15th of each month for the following month's issue. Notices of Births, Marriages, and Deaths are inserted free of charge to subscribers and members of the Corps. All these communications should be written upon one side of the paper only; they should by preference be type-written, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed The Editor, "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS," War Office, Whitehall, London, S.W.

Communications have been received from Captain D. B. McGrigor, Major J. V. Forrest, Major L. W. Harrison, Surgeon-General Sir David Bruce, Captain R. G. Archibald, Lieutenant W. S. R. Steven, Quartermaster-Serjeant W. E. Squire, Captain J. B. Hanafin, Captain T. J. Mitchell, Staff-Serjeant W. A. Muirhead, Lieutenant E. V. Whitby, Captain R. Tilbury Brown, Serjeant A. Dady, Major J. B. Anderson, Major E. Ryan, Major S. H. Fairrie, Lieutenant J. H. M. Frobisher, Colonel R. H. Firth.

The following publications have been received :—

British : The Army Service Corps Journal, The Indian Medical Gazette, The Lancet, The Hospital, The Journal of State Medicine, The Australasian Medical Gazette, The Middlesex Hospital Journal, The Commonwealth Military Journal, The Royal Engineers' Journal, Medical Press and Circular, Tropical Diseases Bulletin, Public Health, Red Cross and Ambulance News, Guy's Hospital Gazette, The St. Thomas's Hospital Gazette, The Quarterly Journal of Medicine, St. Bartholomew's Hospital Journal, Tropical Veterinary Bulletin, St. Thomas's Hospital Reports, The Cavalry Journal, The Practitioner, The Medical Review, The Army Service Corps Quarterly, Annals of Tropical Medicine and Parasitology, The Journal of Tropical Medicine and Hygiene, Transactions of the Society of Tropical Medicine and Hygiene, The British Journal of Tuberculosis, The Indian Journal of Medical Research, The Journal of Practical Dietetics and Bacterio-Therapeutics, The Indian Journal of Medical Research, The Medical Journal of South Africa, Proceedings of the Royal Society of Medicine, The Shield, The Liverpool Medico-Chirurgical Journal.

Foreign : Russian Military Medical Journal, Schmidt's Jahrbücher, Revista de Sanidad Militar, Le Caducée, Deutsche Militärärztliche Zeitschrift, Bulletin de l'Institut Pasteur, Annali di Medicina Navale e Coloniale, Archiv für Schiffs- und Tropen-Hygiene, Archives de Médecine et Pharmacie Navales, Archives de Médecine et de Pharmacie Militaires, Giornale di Medicina Militare, The Military Surgeon, Bulletin of the Johns Hopkins Hospital, United States Public Health Service, Office International d'Hygiène Publique, American Medicine, Annales d'Hygiène et de Médecine Coloniales, Bulletin de la Société de Pathologie Exotique, Arquivos do Instituto Bacteriologico Camara Pestana.

MANAGER'S NOTICES.

The JOURNAL OF THE ROYAL ARMY MEDICAL CORPS is published monthly, six months constituting one volume, a volume commencing on 1st July and 1st January of each year.

The Annual Subscription is £1 (which includes postage), and should commence either on 1st July or 1st January; but if a subscriber wishes to commence at any other month he may do so by paying for the odd months between 1st July and 1st January at the rate of 1s. 8d. (one shilling and eightpence) per copy. (All subscriptions are payable in advance.)

Single copies can be obtained at the rate of 2s. per copy.

The Corps News is also issued separately from the Journal, and can be subscribed for at the rate of 2s. (two shillings) per annum, including postage. Subscriptions should commence from 1st July each year; but if intending subscribers wish to commence from any other month, they may do so by paying for the odd months at the rate of 2d. per copy. (All subscriptions are payable in advance.)

Officers of the Royal Army Medical Corps possessing Diplomas in Public Health, etc., are kindly requested to register their special qualifications at the War Office. Letters of complaint are frequently received from officers stating that their special qualifications have not been shown in the Distribution List which is published as a supplement to the Journal in April and October of each year. As, however, the particulars of this list are supplied from official sources, officers are reminded that unless the possession of Diplomas, etc., has been registered at the War Office, no entry of such qualifications can be recorded in the Distribution List.

Letters notifying change of address should be sent to the Hon. Manager "Journal of the Royal Army Medical Corps," War Office, Whitehall, London, S.W., and must reach there not later than the 20th of each month for the alteration to be made for the following month's issue.

It is requested that all Cheques or Postal Orders for Subscriptions to the Journal, Corps News, Reprints, &c., be crossed "Holt & Co.," and made payable to the "Hon. Manager, Journal R.A.M.C.," and not to any individual personally

All communications for the Hon. Manager regarding subscriptions, &c., should be addressed to

THE HON. MANAGER,
"JOURNAL OF THE ROYAL ARMY MEDICAL CORPS,"
WAR OFFICE, WHITEHALL, S.W.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

SEPTEMBER, 1914.

ARMY MEDICAL SERVICE.

THE undermentioned Colonels, on completion of four years' service in their rank, are placed on the half-pay list: Richard H. S. Sawyer, M.B., dated August 3, 1914; John C. Culling, dated August 8, 1914.

The undermentioned Colonels are restored to the establishment, and are supernumerary: Robert Porter, Menus W. O'Keeffe, and Thomas J. O'Donnell, D.S.O., dated August 5, 1914; Richard H. S. Sawyer, dated August 3, 1914; John C. Culling, dated August 8, 1914.

The undermentioned Lieutenant-Colonels, from the Royal Army Medical Corps, to be Colonels: James Meek, M.D., dated August 3, 1914; William T. Swan, M.B., dated August 8, 1914.

ROYAL ARMY MEDICAL CORPS.

The undermentioned Majors to be Lieutenant-Colonels: Claude B. Martin, M.B., and Charles B. Lawson, M.B., dated August 3, 1914. Joseph F. M. Kelly, M.B., dated August 6, 1914; Gilbert S. Crawford, M.D., dated August 8, 1914.

Major Frederick A. Stephens, from the half-pay list, is restored to the establishment, dated August 4, 1914.

Captain Robert J. B. Buchanan is placed temporarily on the half-pay list on account of ill-health, dated August 8, 1914.

The undermentioned Lieutenants are confirmed in their rank: George E. Dyas; Percival Warburton; Allan Watson, M.B.; Norman V. Lothian, M.B.; John G. Gill, M.B.; David W. Rintoul, M.B.; Sidney M. Hattersley, M.B.; John W. C. Stubbs, M.B.; Arthur J. A. Menzies, M.B.; John F. G. Gwynne, M.B.; Thomas F. P. Breen, M.B.

The undermentioned to be Lieutenants, dated July 31, 1914:—

David Charles Gordon Ballingall, M.B., late Officers Training Corps; Herbert Gregory Winter, James Millar Evatt, late Officers Training Corps; Francis Geoffrey Thatcher, M.B., late Officers Training Corps; William Percival Mulligan, M.B., late Officers Training Corps; Gerard Prideaux Selby, from the Officers Training Corps; John Gillis Butt, M.B.; Neil Cantlie, M.B., from the Officers Training Corps; Edward Albert Parry Brock, late Officers Training Corps; Lieutenant Percival Thomas Priestley, M.B., from the Royal Army Medical Corps Special Reserve; Edward Phillips, M.B.; Spence Daer Reid, M.B.; Peter Joseph Ryan, M.B.; Barcroft Joseph Leech Fayle; Evelyn Alexander Sutton.

The undermentioned Lieutenants are restored to the establishment, dated August 4, 1914:—

Treffry O. Thompson, Lewis R. Shore.

The undermentioned Serjeant-Majors to be Quartermasters, with the honorary rank of Lieutenant, dated August 12, 1914:—

William Henry Giddings, Samuel Stevens, Edward Hartley Senior, Edmund Edser, William Brennan, Ernest O'Hara, Alexander Gray Tod, Thomas John Tilbrook, Frederick Charles Cross, John Jackson, Frank Oswald Chappell, Walter Albert Taylor, Willie Wilson, Ernest James Tilbury, Alfred Harwood, Arthur Percival Barnard, Charles Arthur Figg, William Clifford Renton.

ARMY MEDICAL SERVICE.

Royal Army Medical Corps, the undermentioned are granted the temporary rank of Lieutenant whilst employed with the Army:—

Dated August 6, 1914.—Richard Bridge Lilly.

Dated August 7, 1914.—Frederick George Chandler, M.B.; Arthur Joseph Eagleton, M.B.; George Dearden Jameson; Alma Percy Ford; Reginald Kinloch MacGregor; Harold Young Mansfield, M.B.; Leonard Colin Somervell; Henry Washington Batchelor; Malcolm Donaldson, M.B., F.R.C.S.; Robert Graham Brown; Owen Lambert Vaughan de Wesselow, M.B.; Kenneth Blackie Aikman; Duncan Westlake Pailthorpe; Charles Stewart Parnell Hamilton; John Frank Taylor, M.B.; William Henry Dakin Smith, M.B.; Horace William Hay; St. John Dudley Buxton; Harold Archibald Douglas, M.B.; Henry Drummond Robb, M.B.; Alexander Frederic Potter; John Archer Cowan, M.B.; Maitland Radford, M.B.; William Muir Howells, M.B.; Herbert Arnold Watermeyer; Gilbert Charles Chubb, M.B., F.R.C.S.; William Kelsey-Fry; Arthur John Waugh; Hamish Morton Anderson, M.B.; George Christopher Metcalfe; Charles Samuel Eric Wright, M.B.; John Bramley Moore, M.D.; Louis Lazarus; Arthur Gordon Haynes Lovell, M.B., F.R.C.S.; Howard Alexander Bell; Ernest Scott, M.B.; William Allan, M.B.; George Henry Chisnall, M.B.; Ivan Stuart Wilson, M.D., F.R.C.S.; Martyn Herbert Watney, M.B.; Sidney Arthur Boyd, F.R.C.S.

Dated August 8, 1914.—Charles William Berry Littlejohn, M.B.; Rupert Strathmoore Scott; Vernon Charles Whitby Vickers; James La Fayette Lauder; Percy Patrick Butler; Henry Barton Owens; William Howard Lister; Walter Perceval Yetts.

Dated August 9, 1914.—Edwin Joseph Wyler, M.D.; Arthur Edward Brown; Lionel Dudley Woods; Stanley Arnott, M.B.; Francis Henderson, M.B.; Robert Ker Sutherland, M.B.; Herbert O'Callaghan, M.B.; Edward Biling; William Edward Hallinan; William Grant Waugh, M.D.; Henry Robinson, M.B.; Eric Lofts Mackenzie, M.B.; Bernard Venn Dunn, M.B.; Hyacinth Bernard Morgan, M.B.; Thomas Lochhead Fraser, M.B.

Dated August 10, 1914.—Hugh James Orr-Ewing, M.B.; David Galloway Watson, M.B.; Hugh Duberley Willis, M.B.; Monamy Aston Cornwall Buckell, M.B.; Claude Charles Harrison, M.B.; George Maclean Campbell, M.B.; Robert Duncan Mearns Macpherson, M.B.; Cyril Sherris, M.B.; Allan Mann, M.B.; John Whigham, M.B.; Ronald Silcock; Cyril Evered Thwaites; John Berry Haycraft, M.B.; Reginald Samuel Sherard Statham, M.D.; Cecil Beresford Hogg, M.B.; Arthur Samuel Glynn, M.B.; John Dotto; Ronald Hodson, M.B.; John Stanley Avery, M.B.; John Luke Jackson, M.B.; Findlay Murchie, M.B.; William Oswald Halpin, M.D.; Frederick Edward Saxby Willis; Cyril James Weston Clayton; Lionel Henry Yorke Stephen; Geoffrey Trevor Loughborough; James Ernest Helme Roberts, M.B., F.R.C.S.; Philip William James, M.D.; Eric Wordley, M.B.; Basil William Armstrong; Arthur Ernest Bullock; Fredrick Charles Davies, M.B.; David Harrison Clarke, M.B.; Charles Henry Shorney Webb, M.B., F.R.C.S.; Colin Mackenzie, F.R.C.S.; Humphrey Bowstead Wilson, M.D.; Vincent Townrow, M.B., F.R.C.S.; George Montague Williams Hodges, M.B.; Gerald Arthur Smythe, M.B.; Montague Sydney Woolf; William Reginald Pryn; Edmund Lewis Reid, M.B., F.R.C.S.Edin.; Norman Briggs; William Robert Addis, M.B.; Philip Randal Woodhouse, M.B.; Wilberforce Vaughan Eaves, M.D.; Maitland Scott; Bertram Friend Bartlett; Thomas Victor Somerville; Charles Weller, F.R.C.S.; Cornelius Molan; William John Stewart, M.B.; Wilfred Alan Russell, M.B.; Gavin Stiell Brown, M.B.; John Greene; Lancelot Gerard Bourdillon; James Smith Stewart, M.B.; Donald McDonald Wilson, M.B.; Walter Groome, M.B.; Robert Simpson Snowie, M.B.; Hugh Walker Moir, M.B.; John Buchanan Burgess, M.D.;

Robert John Harley-Mason; William Gordon-Goudie, M.B.; Francis William O'Connor; Charles Newton Binney, M.B.

Dated August 11, 1914.—Edward Worrell Carrington, M.B.; Ralph Lester Scott, M.B., F.R.C.S.; Francis Ruthven Thornton, M.B.; Herbert Henry Powys Morton; Henry Goodwill Wiltshire; Ernest Ronald Walker; Walter Seymour Danks, M.D.; Alexander Bruce Cheves, M.B.; Duncan James McRae, M.B.; Neville Courtney Wallis; Norman Pallister Pritchard; Victor Ewings Negus; John Raymond Waddy; Charles Sidney Atkin; Harold Bedford George Russell; Edward Naggiar Graham, F.R.C.S.; William Henry Johnston; William Aloysius Ryan, M.B.; John Morris; John Benson Young, M.B.; William Francis Evans, M.B.; John Arthur West; Robert Lloyd Roe, M.B.; Cecil Knight Attlee; Ralph Daniel O'Leary, M.B.; Moses John Rowlands, M.D.; Wilfrid Francis Hawkins, M.B.; Nicoll McNicol Rankin, M.B.; Leonard Leigh Hadley, M.B.; Herbert Meredith Harrison; Harold Eustace MacMahon Wall.

Dated August 12, 1914.—Frederick John Thorne, M.B.; Joseph Godwin Greenfield, M.B.; Thomas Arthur Jones; Henry de Courcy Dillon, M.B.; Henry Gordon Greaves, M.B.; Charles Wesley Forsyth, M.B.; Joseph Haslett Elliott, M.D.; James Henry Ritchie, M.B.; Thomas Mudie Low, M.B.; Thomas Herbert Holroyd, M.B.; Andrew Bonar Lindsay, M.B.; Cedric Lewis Dold, M.B.; John McIntyre Falkiner, F.R.C.S.I.; Arthur Stanley Woodwark, M.D.; Frederick John Whitelaw, M.B.; Henry Felix Mullan; Sidney Hubert Nathan, M.D.; Henry James Burke; Herbert Ward Smith, M.B.; Charles Martin Row; Russell Ernest Walker, M.B.; Edward Arthur Aldridge; George Austin Lilly; Malcolm Claud Russell Grahame, M.B.; Montgomery Paterson Paton, M.B.; William Logan Scott, M.B.; George William Kendall, M.D.; Clement Rickard Macleod, M.B.; Stuart Allan Ord Mackenzie, F.R.C.S.Edin.; Cyril Armand Bernard; James Henry Dible, M.B.; William Arthur Wilson-Smith, M.D.; Charles Hotham Evans, F.R.C.S.Edin.; James Robertson Campbell Greenlees, M.B.

Dated August 13, 1914.—Aubrey Dean Vernon-Taylor; Edward Musgrave Woodman, F.R.C.S.; James Evelyn Thoresby Jones; Thomas Martin, M.B.; Rex Stansfield; Herbert Walker; Algernon Charles Stanley Smith; Frederick Theophilus Hill; John Sainsbury, M.B.; George Heaford Varley, M.B.; Alexander Rentoul Esler; Arthur Francis Savory Sladden, M.D.; Kenneth Bruce Dickson; Anthony Bourchier Bradford, M.B.; Herbert William Cooke; William Bonnalie Gordon; David Llewellyn Lewis; Humphry Morshead Hart-Smith, M.B.; James Dennistoun Jones; David Henry Russell, M.D., F.R.C.S.Edin; Hugh James More, M.D., F.R.C.S.Edin.; Charles Holmes Denham, M.B.; Robert Bryson Rutherford, M.B.; Frederick Lewis Napier, M.B.; Norman Frederick Hallows, M.B.; Spencer Lewis Walker, M.B.; Bertie Burnett Ham, M.D.; Samuel Wilson McLellan, M.D., F.R.C.S.Edin.; George Rickman; Charles Malcolm Rout, M.B.; Granville Douglas Robertson; Oliver Keith Hartridge, M.B.; William Allan Stewart; Trevor Abbott Lawder, M.B.; Donald Keith McDowell; George William Smith, M.B.; Alan Douglas Anderson; Arthur Anderson Martin, M.D., F.R.C.S.Edin.

Dated August 14, 1914.—Horace Frederick William Warden; Gurth Swinnerton Blandy, M.B.; George Douglas Ferguson, M.B.; George Ernest Elkington, M.B.; Carlyle Aldis, M.B.; Arthur Joseph Blake; George Robert Denison McGeagh; John Hewat, M.D.; Gilbert Laurie Kerr Finlay, M.B.; Edward O'Connor, M.B.; Aleck William Bourne, M.B., F.R.C.S.; John Donal Carroll, M.B.; William Duguid, M.B.; Robert Henry Cummins Lyons, M.B.; Arthur Starkie Plant; Cecil Bluett; Hubert Arnold Pallant; John William Pell; John Frederick Gwyther Richards, M.B.; Arthur Henry Bindloss, M.B.; Edward Jocelyn Nangle; Robert Mandeville Alcorn; Geoffrey Percy Humphery, M.B.

Dated August 15, 1914.—Arthur Keith Armstrong; Raymond Brewitt Taylor, M.B.; William Llewellyn Gwyn Davies; Harold Sheldon, M.B.; Harold Beckwith Whitehouse, F.R.C.S.; Hugh Lancelot Sells, M.B.; Lawrence Lancaster Satow; John Burnett Matthews; Henry Fairley Marris, M.B.; Alexander Armstrong Rees, M.D.; William Daniel Arthur; James Lennox Stewart, M.B.; William Bently Purchase; Henry John Rutherford Jones; Louis David Cohen; Dumaresq Le Bas; George Noel Braham, F.R.C.S.Edin.; Edwin Cromwell Rayner; Richard Edward Gibson, M.B.; Dudley George Greenfield, M.D., F.R.C.S.; John Burman Lowe, M.B.; Alfred Stewart Wakely; Frederick Malcolm Stirling Hulke; Hamish Douglas Ferguson Brand, M.B.; Basil Thorn Lang, F.R.C.S.; Harold Wiltshire, M.D.; Frederick Butwell Winfield; Thomson Henderson, M.D.; Joseph Brewer; David Morrow; James John Woodburn, M.B.; John Hamilton Hood, M.B.; Robert Valentine Dolbey, F.R.C.S.; Robert John Bowman Madden, M.B.; Philip Whiteside Maclagan, M.B.;

Joan Andrew MacLeod, M.B.; Joseph Archibald Quin, M.B.; Herbert Leslie Hopkins, M.D.; Reginald Hastings Jones, M.B.; Andrew Ernest Seth Pringle-Pattison, M.B.; George Cuthbert Mura M'Gonigle, M.D.; Wilberforce Smith, F.R.C.S.; Cameron Robertson Gibson, M.B.; Leslie Meakin; Richard Wayland Smith, M.B.; Sidney Trevor Davies; Edward Aitkin Seagar, M.B.; James Noble Armstrong, M.B.; Hugh Palliser Costobadie, F.R.C.S.Edin.; Victor Farrar Soothill, M.B.: Arthur Noel Hodges, M.B.; Edward Ercell Steele, M D., Lieutenant Canadian Army Medical Corps; Oscar Reginald Lewis Wilson, M.B.; Charles Edmund Hibbard; Henry Gilbert Peake, M.B.; Arthur Tilbury; Edward Mervyn Thomson; Robert Ernest Lee, M.D.; Henry Dyas Gasteen; Andrew Dillon Carberry, F.R.C.S.I.

Dated August 16, 1914.—Adolph Richard Niel MacGillicuddy; Robert Molyneux Miller; Harold Edward Battle; Carleton Yates Ford, M.D.; George John Williams Keigwin; Ernest Spencer Miller, M.D.; Kenneth Alexander Maclean, M.B.; Alexander Wilmot Uloth; William Vere Taylor Styles; Theodore Hartmann Just, M.B.; Francis Howard Cleveland; Lionel Caldbeck Esmonde Murphy; Thomas Stevens Allen; Philip Ferguson, M.B., F.R.C.S.; Thomas Lionel Hardy, M.B.; Maurice Nasmith Perrin; Geoffrey Langdon Keynes; William Leonard Cassells, M.B.; Hector Mortimer, M.B.; John Harry Meers; Joseph Pearson Little; Kenneth Perrie Mackenzie, M.B.; Richard Douglas Passey, M.B.; Edmund Hume Moore, M.B.; Ernest Harrison Griffin, M.D.; Montague Pern; Edward Thomas Campbell Milligan, M.D.; James Fairburn Fairley, M.D., F.R.C.S.; Sydney Fancourt McDonald, M.D.; Henry Linnington Martyn, M.B., F.R.C.S.; Thomas Eric Parker, M.B.; Cecil Corbin, M.B.; Charles Robertson Porter; Edward Green Foley; William Ewen Reid, M.B.; George Grantham Anderson, M.B.; Charles Joseph O'Reilly, M.B.; Horatio Francis Ninian Scott, M.D.; Henry Cordner, M.B.; Francis Hernaman-Johnson, M.D.; Frank Davidson Cairns, M.B.; Bernard Harry Wedd, M.D.; Geoffrey Mason-Fleming, M.B.; Robert Ernest Lee, M.D.; Henry Dyas Gasteen; Andrew Dillon Carberry, F.R.C.S.I.

Dated August 17, 1914.—George William Lister Kirk, M.B.; David Carmichael Monro, M.B.; John Marchbank Gillispie, M.B.; Alister Forbes Cowan, M.B.; Frederick Charles Atkinson-Fleming, M.B.; Alexander Baldie, M.B.; James Alexander Raeburn, M.D.; Arthur Turnbull, M.B.; Henry Christian Ernest Quin; Herbert Frederick Adams, M.B.

Dated August 18, 1914.—William Foot, M.B.; Frederick Cecil Kyle Austin, M.B.; Allan Leslie Christie, M.B.; Alexander Tulloh Inglis Macdonald, M.D.; Sidney Smith.

Dated August 19, 1914.—Norman William Anderson, M.D.; Ivan Clarkson Maclean, M.D.; John Cecil Hallinan; Robert Sewers Berry.

Dated August 20, 1914.—John Wycliffe Linnell, M.D.; Henry Wyndham Goodden, M.B.; Arthur Wesley Dennis, M.B.; Arthur Dodsworth Haydon; Robert Richmond Archibald, M.B.; Major Thomas Kay, M.B., Royal Army Medical Corps, Territorial Force; Arthur Griffith Maitland-Jones; Ian Macdonald Brown; Byron Levick Hutchence.

Dated August 24, 1914.—Howard Havelock Hepburn, M.D.; Ambrose Lorne Lockwood, M.D.

SPECIAL RESERVE OF OFFICERS.

South Irish Horse.

Surgeon-Captain Frederick F. McCabe, M.B., to be Surgeon-Major, dated August 4, 1914.

Royal Army Medical Corps.

No. 18 *Field Ambulance.*—The undermentioned Captains to be Majors, dated August 19, 1914: Charles Roberts, M.B., F.R.C.S.; Henry G. Smeeth, M.D.

The undermentioned Officers of the Royal Army Medical Corps (Territorial Force) to be appointed to the Ambulance, dated August 4, 1914; Captain Albert Ramsbottom, M.D., 1st East Lancashire Field Ambulance, to be Captain; Captain William Fraser Munro, M.B., 2nd East Lancashire Field Ambulance, to be Captain; Lieutenant Kingsmill Williams Jones, M.D., 3rd East Lancashire Field Ambulance, to be Lieutenant; Lieutenant William James Reid, 3rd East Lancashire Field Ambulance, to be Lieutenant; Captain David Brynmor Chilies-Evans, M.B., 3rd Welsh Field Ambulance, to be Captain, dated August 5, 1914.

The undermentioned cadets and ex-cadets of the Officers Training Corps to be Lieutenants:—

Dated July 29, 1914.—William Napier; Donald Reid Wheeler.

Dated August 3, 1914.—Richard Feltrim Fagan.

Dated August 4, 1914.—John Robert Crolius; Francis Henry Guppy; Richard Feltrim Fagan; John Mitchell Watt.

Dated August 5, 1914.—Cyril James Anthony Griffin; Robert Ellis, M.B.; Norman Lois Reis; William Henry Arthur Douglas Sutton; Christopher George Schurr; James Edward Jameson; John Francis Lyons; Cyril Edward Hammond Gater; Thomas Charles Studley; Charles Dudley Maybury Buckley, M.B.; John Cecil Alexander Dowse, M.B.; Harry Ernest Bantry White, M.B.; Mortimer McGee Russell; Joseph Patrick Quinn; Edgar Llewellyn Foot Nash.

Dated August 6, 1914.—Frank Cook, M.B., F.R.C.S.; Raymond Stowers; John Archibald Binning; Francis Gerald Augustus Smyth; Clifford William Sparks; Robert Lance Impey; Bertrand Cecil Owens Sheridan; Douglas Chetham Pim.

Dated August 8, 1914.—Ennis Ratcliff Chambers; John Stuart Dockrill; Douglas Cran; Thomas Clifford Owen; George Dalziel, M.B.

Dated August 9, 1914.—William Dunlop; Harry Edmund Cresswell; John Stephenson; Henry Kenneth Victor Soltau; Robert Paul Scott Mason; John Armstrong Crozier Kidd; John Lansdowne Perceval; Edward Noel Hillman Gray; Richard Edward Grandy, M.B.; Maurice Baylis King.

Dated August 11, 1914.—Eric Spanton Mawe.

Dated August 12, 1914.—James Carter Ogilvie.

Dated August 13, 1914.—Cecil McLaren West; Frank Percy Freeman.

The undermentioned to be Lieutenants:—

Dated August 6, 1914.—Richard Amyas Preston, M.B.; Arthur Bennett Preston; Charles Hamblin Thomas.

Dated August 11, 1914.—Philip Seston Vickerman, M.B., late Lieutenant, Royal Army Medical Corps, Special Reserve.

Dated August 13, 1914.—John William McNee, M.B.

The undermentioned officers from the Unattached List, Officers Training Corps, to be Lieutenants:—

Lieutenant William Campbell Mackie, M.B., dated August 9, 1914; Second Lieutenant William Broughton Alcock, M.B., dated August 10, 1914.

TERRITORIAL FORCE DECORATION.

The King has been graciously pleased to confer the Territorial Decoration upon the undermentioned officers of the Territorial Force, who have been duly recommended for the same under the terms of the Royal Warrant, dated August 17, 1908:—

Royal Army Medical Corps.

Officers attached to other Units.

Major John Robinson Harper, attached to the Royal North Devon (Hussars) Yeomanry.

Major William Sinclair, M.B., attached to the City of Aberdeen (Fortress) Engineers, Royal Engineers.

Major Frederick Lace, attached to the 4th Battalion, Prince Albert's Light Infantry (Somerset Light Infantry).

Major Thomas Holt, M.B., attached to the 6th Battalion, The Lancashire Fusiliers.

Major William Mabson Gabriel, attached to the 6th Battalion, The Duke of Wellington's (West Riding Regiment).

Major John Boyd Jamieson, attached to the Lowland Divisional Transport and Supply Column, Army Service Corps.

TERRITORIAL FORCE.

Yeomanry.

Nottinghamshire (Sherwood Rangers).—Surgeon-Captain George Thomson, M.B., to be Surgeon-Major, dated February 26, 1914.

Infantry.

5th (Cumberland) Battalion, The Border Regiment.—Surgeon-Lieutenant William Marley-Cass, from the Territorial Force Reserve, to be Surgeon-Lieutenant, dated August 22, 1914.

Royal Army Medical Corps.

Commands and Staff.—Lieutenant-Colonel Laurence J. Blandford, M.D., from the 2nd Northumbrian Field Ambulance, Royal Army Medical Corps, to be Divisional Sanitary Officer, Northumbrian Division, Royal Army Medical Corps, vice Major Thomas E. Hill, M.B., who resigns his commission, dated August 8, 1914.

Highland Mounted Brigade Field Ambulance.—Evan Alexander Mackenzie, to be Lieutenant, dated August 22, 1914.

Notts and Derby Mounted Brigade Field Ambulance.—Herbert Smith Wallace, M.B., to be Lieutenant, dated June 27, 1914; Oswald Kentish Wright, M.B., to be Captain, dated July 31, 1914.

North Midland Mounted Brigade Field Ambulance. — Lieutenant Thomas D. Buchanan to be Captain, dated August 19, 1914.

Eastern Mounted Brigade Field Ambulance.—Meredith Sedgwick Doubble (late Captain, Eastern Mounted Brigade Field Ambulance) to be Captain, dated August 26, 1914.

3*rd Highland Field Ambulance.* —Douglas Hay Scott to be Lieutenant, dated August 19, 1914.

2*nd Lowland Field Ambulance.*—Lieutenant Dugald H. MacPhail to be Captain, dated July 4, 1914.

3*rd Lowland Field Ambulance.*—James Abbey Henderson, M.B., to be Lieutenant, dated August 22, 1914; Lieutenant Arthur Cotterell McMaster, M.B., from the 1st New Zealand Field Ambulance, to be Lieutenant, dated August 29, 1914.

3*rd West Lancashire Field Ambulance.*—Harry Middleton, M.B., to be Lieutenant, dated August 22, 1914.

1*st East Lancashire Field Ambulance.*—The undermentioned to be Lieutenants, dated August 22, 1914: John Morley, M.B.; Frederick Stanley Bedale; Alexander Morrison Mackay, M.B.

2*nd East Lancashire Field Ambulance.* — Lieutenant William J. Purves to be Captain, dated June 21, 1914.

3*rd East Lancashire Field Ambulance.*—The undermentioned to be Lieutenants, dated August 22, 1914; John Cecil Jefferson, M.B., F.R.C.S.; Nicholas Hopkins Henry Haskins, M.B.; Frank Kershaw Tomlinson, M.B.

1*st Welsh Field Ambulance.*—Joseph Muller Fonseca to be Lieutenant, dated August 26, 1914.

1*st Northumbrian Field Ambulance.*—Major Frank Hawthorn, M.D., to be Lieutenant-Colonel, dated August 22, 1914.

2*nd Northumbrian Field Ambulance.*—Captain Duncan A. Cameron, M.B., to be Major, dated August 8, 1914.

3*rd Northumbrian Field Ambulance.*—Captain Stanley Fox Linton, M.B., from the list of Officers attached to units other than Medical Units, to be Captain, dated May 26, 1914; Lieutenant Augustus F. Perl to be Captain, dated July 13, 1914.

1*st West Riding Field Ambulance.*—Harry Lee to be Lieutenant, dated August 22, 1914.

2*nd West Riding Field Ambulance.*—The undermentioned Captains to be Majors: Harold Collinson, M.B., F.R.C.S., dated August 5, 1914; Frederick Whalley, M.B., dated August 6, 1914; Craufurd Tait Matthews to be Lieutenant, dated August 19, 1914.

1*st North Midland Field Ambulance.*—Herbert Woodley Joyce to be Lieutenant, dated August 22, 1914.

2*nd North Midland Field Ambulance.*—The undermentioned to be Lieutenants, dated August 26, 1914: Lionel Thomas Challenor; Maurice Holdsworth Barton.

3*rd North Midland Field Ambulance.*—Lieutenant Crichton Stirling Lee is seconded, dated August 29, 1914.

1*st South Midland Field Ambulance.*—The undermentioned to be Lieutenants, dated August 19, 1914: Morris Wilks, M.B.; William Bowater. The undermentioned Captains to be Majors, dated August 26, 1914: William Malcolm Sturrock, M.B. William McCall, M.B.

2*nd South Midland Field Ambulance.*—The undermentioned to be Lieutenants, dated August 22, 1914: William James Charles Bruerton Pitt; Ernest Joseph Clifford Groves, M.B.; Ralph Alexander Broderick, M.B. Kenneth Arly Petersfield Rynd Murray to be Lieutenant, dated August 29, 1914. Lieutenant John Dale, M.B., to be Captain, dated August 26, 1914.

1*st Home Counties Field Ambulance.*—Robert Reginald John Holmes to be Lieutenant, dated August 22, 1914.

2nd City of London Field Ambulance.—Louis Courtauld, M.B., to be Lieutenant, dated August 26, 1914.

3rd London (City of London) Field Ambulance.—Quartermaster and Honorary Lieutenant John W. Kemp resigns his commission, dated August 29, 1914.

6th London Field Ambulance.—Lieutenant Joseph E. Ryan, M.D., to be Captain, dated August 1, 1914.

3rd Scottish General Hospital.—James Robertson Campbell Greenlees, M.B., to be Captain, dated August 19, 1914.

4th Scottish General Hospital.—Captain James S. Barr, M.B., resigns his commission, dated August 26, 1914.

1st Western General Hospital.—Pantland Hick, M.D., to be Captain, dated August 22, 1914.

1st Northern General Hospital.—Thomas Gibbs, late Staff Sergeant, Royal Army Medical Corps, to be Quartermaster, with the honorary rank of Lieutenant, dated July 19, 1914.

2nd Northern General Hospital.—Joseph le Fleming Coy Burrow, M.B., to be Captain, dated August 26, 1914. The undermentioned to be Captains, dated August 29, 1914: George Constable Hayes, F.R.C.S.; Edward Walter Bain, F.R.C.S.; Charles Wilfred Vining, M.D.; Samuel Wilfred Daw, F.R.C.S.

3rd Northern General Hospital.—Professor Henry Roy Dean, M.D., F.R.C.P., to be Major, dated August 19, 1914.

4th Northern General Hospital.—Lieutenant-Colonel George S. Stephenson, M.D., resigns his commission, dated August 26, 1914; Hugh Bernard Willoughby Smith, M.B., F.R.C.S., to be Captain, dated August 26, 1914.

5th Northern General Hospital.—Captain Robert W. W. Henry, M.D., to be Major, dated August 22, 1914.

1st Southern General Hospital.—The undermentioned to be Captains, dated August 11, 1914: Bernard Joseph Ward, F.R.C.S.; Samuel George Webb.

4th Southern General Hospital.—Edward Revely Clarke, M.B., to be Captain, dated August 19, 1914.

5th Southern General Hospital.—Captain Edward J. D. Taylor, M.B., from the Mobilization List to the permanent personnel, to be Major, dated August 19, 1914; Lieutenant-Colonel and Honorary Surgeon-Colonel George G. Sparrow resigns his commission, dated August 22, 1914; Lieutenant-Colonel John R. S. Robertson, M.B., resigns his commission, dated August 22, 1914; Major Charles F. Routh, M.B., to be Lieutenant-Colonel, dated August 22, 1914. The undermentioned Captains to be Majors, dated August 22, 1914: Charles A. S. Ridout, M.D., F.R.C.S.; Rolland A. Dove, M.B. The undermentioned to be Captains, dated August 22, 1914: Hugh Browning Taylor Morgan, M.D.; John Blackwood; Henry Lloyd Driver; William Carling, M.B.; Philip Herbert Green, M.B.

2nd Eastern General Hospital.—Quartermaster and Honorary Major Theodore F. H. Briscoe is seconded, dated August 29, 1914; Harcourt Howard Ross to be Quartermaster with the honorary rank of Lieutenant, dated August 29, 1914.

1st London (City of London) General Hospital.—Major D'Arcy Power, M.B., F.R.C.S., to be Lieutenant-Colonel, dated August 22, 1914; Major Charles B. Lockwood, F.R.C.S., resigns his commission, dated August 29, 1914.

3rd London General Hospital.—The undermentioned to be Captains, dated August 19, 1914: Theodore Gilbert Alexander Burns; Francis Woodcock Goodbody, M.D.; Francis Howard Humphries, M.D.; Arthur Edward Doson; Somerville Hastings, F.R.C.S.; Raymond Ebenezer Apperly.

4th London General Hospital.—Walter d'Este Emery, M.D., to be Captain, dated August 19, 1914; Lieutenant-Colonel Nestor I. C. Tirard, M.D., from the Mobilization List to be Lieutenant-Colonel on the permanent personnel, dated August 26, 1914; Captain Ernest R. Carling, M.B., F.R.C.S., to be seconded under the conditions of paragraph 112 of the Territorial Regulations, dated August 26, 1914. The undermentioned officers to be seconded, dated August 26, 1914: Major Richard G. Hebb, M.D.; Captain Raymond H. P. Crawford, M.D.; Captain Francis Jaffrey, F.R.C.S.; Captain Edmund I. Spriggs, M.D. Captain William Turner, M.B., F.R.C.S., is seconded under the conditions of paragraph 112 of the Territorial Force Regulations, dated August 29, 1914.

1st *London* (*City of London*) *Sanitary Company.*—The undermentioned to be Lieutenants, dated August 22, 1914: Arthur Thomas Pitts; Evelyn Charles Sprawson. Cresacre George Moor to be Lieutenant (to be supernumerary), dated August 26, 1914.

Sanitary Officers.—Captain John Dale, M.B., is appointed Sanitary Officer to the South Midland Territorial Division, dated August 26, 1914; Captain Middleton Connon, M.D., is seconded, dated August 29, 1914.

West Riding Clearing Hospital.—Sergeant James Carr to be Quartermaster, with the honorary rank of Lieutenant, dated August 22, 1914.

North Midland Clearing Hospital.—Bernard Stracey, M.B., to be Captain, dated August 22, 1914.

East Anglian Clearing Hospital.—The announcement of the transfer of Major James S. Warrack, M.D., attached to units other than medical units, which was announced in the *London Gazette* of July 28, 1914, is cancelled; John William Price (late Quartermaster, 1st West Lancashire Field Ambulance) to be Quartermaster, with the honorary rank of Lieutenant, dated August 26, 1914.

Home Counties Clearing Hospital.—Major James S. Warrack, M.D., from attachment to units other than medical units, to be Major, dated June 25, 1914.

1st *London Clearing Hospital.*—John Wallace Kemp (late Quartermaster and Honorary Lieutenant, 3rd London (City of London) Field Ambulance) to be Captain, dated August 29, 1914.

OFFICERS ATTACHED TO OTHER UNITS.

The undermentioned Lieutenants to be Captains; Richard P. Ryan, F.R.C.S.I., dated January 1, 1914; William Murray M.D., dated April 16, 1914; David G. Kennard, dated August 19, 1914; Surgeon-Lieutenant S. E. Rigg to be Surgeon-Captain, dated July 15, 1914.

The undermentioned to be Lieutenants; Walter Rowley Bristow, M.B., F.R.C.S. dated June 28, 1914; Oswald Lowndes Scarborough, dated July 22, 1914; Reginald Cavan Neil, dated August 6, 1914; Harold Dearden, dated August 19, 1914; George Alexander Brogen, M.D., dated August 22, 1914; Charles Gordon Brentnall, M.B., Charles Wright Edwards, F.R.C.S., and Leonard West, M.B., dated August 26, 1914; Reginald Samuel Sherard Statham, M.D., dated August 29, 1914.

SUPERNUMERARY FOR SERVICE WITH THE OFFICERS TRAINING CORPS.

Cadet Quartermaster-Serjeant Thomas Douglas Inch, M.B., Edinburgh University Contingent, Senior Division, Officers Training Corps, to be Lieutenant for service with the medical unit of that contingent, dated August 19, 1914.

BIRTHS.

BRYDEN.—On September 5, at Elswitha Hall, Gainsborough, the wife of Captain R. A. Bryden, R.A.M.C., of a daughter.

HART.—At Cannanore, Malabar, on July 10, the wife of Captain H. P. Hart, R.A.M.C., of a daughter.

STEELE.—On August 23, at Tidworth, Salisbury Plain, the wife of Major W. L. Steele, R.A.M.C., of a son.

DEATHS.

DAY.—On August 11, at Chelsea, Lieutenant-Colonel William Bullen Day, M.B., retired, late R.A.M.C., aged 53.

DUNCAN.—On August 7, at Barrow, Lieutenant-Colonel Sidney Edward Duncan, retired, late R.A.M.C., aged 58.

ELKINGTON.—On August 5, at London, Lieutenant-Colonel Percival George Elkington, R.A.M.C., aged 49.

HOME.—On August 9, at London, Surgeon-General Sir Anthony Dickson Home, V.C., K.C.B., retired, Army Medical Staff, aged 87.

EXCHANGES, &c.

The charge for inserting Notices respecting Exchanges in the Royal Army Medical Corps is 5/- *for not more than five lines, which should be forwarded by Cheque or P.O.O., with the notice, to Messrs. G. STREET and CO., Ltd.,* 8, *Serle Street, London, W.C., not later than the* 22*nd of the month.*

A free issue of twenty-five reprints will be made to contributors of Original Communications, and of twenty-five excerpts of Lectures, Travels, and Proceedings of the United Services Medical Society.

Any demand for excerpts, additional to the above, or for reprints, must be forwarded at the time of submission of the article for publication, and will be charged for at the following rates, and additional copies at proportionate rates:—

Number of Reprints	Number of Pages	Cost of Reprints	Cost of EXCERPTS *	Extra for Covers for Reprints: As Journal, Printed on Front	Extra for Covers for Reprints: As Journal, Plain, Unprinted	Extra for Covers for Reprints: Cheaper Paper, Printed on Front	Extra for Covers for Reprints: Cheaper Paper, Plain, Unprinted
		£ s. d.	£ s. d.	s. d.	s. d.	s. d.	s. d.
12	4	0 2 6	0 1 0				
	8	0 4 6	0 2 0	3 6	0 11	3 2	0 7
	16	0 7 6	0 3 6				
25	4	0 3 0	0 1 3				
	8	0 5 6	0 2 6	4 0	1 3	3 6	0 9
	16	0 9 6	0 4 6				
50	4	0 4 0	0 1 8				
	8	0 6 9	0 3 2	5 0	1 9	4 0	1 0
	16	0 12 0	0 5 3				
100	4	0 5 6	0 2 9				
	8	0 9 0	0 4 4	6 6	3 3	5 6	2 0
	16	0 16 9	0 6 9				
200	4	0 8 6	0 4 0				
	8	0 13 6	0 6 0	9 0	6 3	7 6	4 0
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* These are not arranged as Reprints, but appear precisely as in the Journal with any other matter that may happen to appear on the first and last pages of the particular excerpt ordered.

Notices.

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, etc. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts, and commands at home and abroad.

Matter intended for the Corps News should reach the Editor not later than the 15th of each month for the following month's issue. Notices of Births, Marriages, and Deaths are inserted free of charge to subscribers and members of the Corps. All these communications should be written upon one side of the paper only; they should by preference be type-written, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed The Editor, "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS," War Office, Whitehall, London, S.W.

Communications have been received from Colonel R. H. Firth, Major N. E. Harding, Major C. F. Wanhill.

The following publications have been received :—

British : The Red Cross, Medical Press and Circular, The Hospital, The Lancet, The Royal Engineers' Journal, St. Bartholomew's Hospital Journal, The Medical Review, The St. Thomas's Hospital Gazette, The Australasian Medical Gazette, The Practitioner, Bulletin of Entomological Research, Guy's Hospital Gazette, Public Health, Red Cross and Ambulance News, Report of the Brompton Hospital Sanatorium, Frimley, Tropical Diseases Bulletin, St. Bartholomew's Hospital Report, Vol. 50, *The Journal of State Medicine, Medical Journal of Australia, The Journal of Tropical Medicine and Hygiene, Journal of the Royal United Service Institution, The Medical Journal of South Africa.*

Foreign : Revista de Sanidad Militar, Le Caducée, The Military Surgeon, Bulletin of the Johns Hopkins Hospital, The Journal of Infectious Diseases, United States Public Health Service, Giornale di Medicina Militare.

MANAGER'S NOTICES.

The JOURNAL OF THE ROYAL ARMY MEDICAL CORPS is published monthly, six months constituting one volume, a volume commencing on 1st July and 1st January of each year.

The Annual Subscription is £1 (which includes postage), and should commence either on 1st July or 1st January; but if a subscriber wishes to commence at any other month he may do so by paying for the odd months between 1st July and 1st January at the rate of 1s. 8d. (one shilling and eightpence) per copy. (All subscriptions are payable in advance.)

Single copies can be obtained at the rate of 2s. per copy.

The Corps News is also issued separately from the Journal, and can be subscribed for at the rate of 2s. (two shillings) per annum, including postage. Subscriptions should commence from 1st July each year; but if intending subscribers wish to commence from any other month, they may do so by paying for the odd months at the rate of 2d. per copy. (All subscriptions are payable in advance.)

Officers of the Royal Army Medical Corps possessing Diplomas in Public Health, etc., are kindly requested to register their special qualifications at the War Office. Letters of complaint are frequently received from officers stating that their special qualifications have not been shown in the Distribution List which is published as a supplement to the Journal in April and October of each year. As, however, the particulars of this list are supplied from official sources, officers are reminded that unless the possession of Diplomas, etc., has been registered at the War Office, no entry of such qualifications can be recorded in the Distribution List.

Letters notifying change of address should be sent to the Hon. Manager, "Journal of the Royal Army Medical Corps," War Office, Whitehall, London, S.W., and must reach there not later than the 20th of each month for the alteration to be made for the following month's issue.

It is requested that all Cheques or Postal Orders for Subscriptions to the Journal, Corps News, Reprints, &c., be crossed "Holt & Co.," and made payable to the "Hon. Manager, Journal R.A.M.C.," and not to any individual personally.

All communications for the Hon. Manager regarding subscriptions, &c., should be addressed to

THE HON. MANAGER,
"JOURNAL OF THE ROYAL ARMY MEDICAL CORPS,"
WAR OFFICE, WHITEHALL, S.W.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

OCTOBER, 1914.

ARMY MEDICAL SERVICE.

Deputy Director-General, Army Medical Service :—

Dated October 15, 1914.—Colonel Michael W. Russell, and to be temporary Surgeon-General, *vice* Surgeon-General W. G. Macpherson, C.M.G., M.B., Honorary Physician to the King.

ROYAL ARMY MEDICAL CORPS.

Dated August 31, 1914.—Major John D. Alexander, M.B., to be Lieutenant-Colonel, *vice* Morris.

The undermentioned Captains to be Majors :—

Dated September 1, 1914.—John W. S. Seccombe; Herbert V. Bagshawe; Robert J. Franklin; Maurice G. Winder; George H. J. Brown, M.B.

Dated August 8, 1914.—Supernumerary Captain Harry S. Rankin, from the seconded list, is restored to the establishment.

The undermentioned Serjeant-Majors to be Quartermasters, with the honorary rank of Lieutenant :—

Dated August 12, 1914.—George John Smith; Arthur Huntingford; John Wickersham; Frank Higdon; George Thomas Bray; Edwin Birch; Burton Charles Dring; Arthur George Powell; Robert Scott Adie Reynolds; Charles Drury; Frederick John Filmer.

Quartermaster and Honorary Lieutenant John Glennon, Royal Army Medical Corps, is granted the honorary rank of Captain, dated August 5, 1914.

Lieutenant-Colonel Arthur E. Morris, M.D., is retained on the active list under the provisions of Article 120, Royal Warrant for Pay and Promotion, 1913, and to be Supernumerary, dated August 31, 1914.

ARMY MEDICAL SERVICE.

The undermentioned are granted the temporary rank of Lieutenant :—

Dated August 5, 1914.—James George Blyth Coleman, M.D.; Frank Whitby, M.B.

Dated September 18, 1914.—Henry Anderson Lunn.

Dated August 6, 1914.—Ralph Roylance Scot.

Dated August 10, 1914.—Maurice Ahern O'Callaghan.

Dated August 22, 1914.—Edward William Archer, M.B.; Galvin Alexander Elmslie Argo, M.B.; Robert Harper Alexander, M.B.; Leslie Adamson, M.D.; John Scouler Buchanan, M.B.; Mark Blakiston Baines, M.D.; Gideon Robert Ernest Colquhoun;

Michael Joseph Cronin, M.B.; Spencer Stawell Crosse; Durie Avery Chamberlain; David Duncan Craig, M.B.; Walter Dawson, M.B.: Cosmo William Fowler, M.B.; Rudolf William Galloway, M.B.; Harry Leroy Satterlee Griffiths: Thomas Gilchrist, M.B.; Ronald Nelson Hunter; Charles Herbert Hart, M.B.; Robert Hamer Hodges; William Henderson, M.B.; Thomas Herbert Williams Idris; Francis Henry Moxon, M.B.; James Murray McLaggan, M.B.; Douglas McAlpine, M.B.; Francis Leslie Nash-Wortham, F.R.C.S.Edin.; John Proctor, M.B.; Cresswell Lee Pattison, M.B.; William Douglas Reid, M.B.; Gerald Noel Boyd Sebastian; Issachar Reuben Smith, M.B.; Thomas Sidney Stafford: Andrew Topping, M.B.; Edward Hugo Udall; John Mayor Wilson.

Dated August 22, 1914.—Henry Andrew Lash.

Dated August 23, 1914.—James Fairley M.D.

Dated August 24, 1914.—John Maitland Stenhouse, M.B.

Dated August 25, 1914.—Francis Arthur Osborn.

Dated August 26, 1914.—Albert Theophilus Duka, D.S.O.; Hedley Boyers, M.B.; Issac Jones, M.D.

Dated August 27, 1914.—James Burr Cruickshank, M.B.; William Frier, M.B.

Dated August 28, 1914.—Tom Bragg; Arthur Vernon Poyser, M.B.; Frank Anthony Hampton, M.B.

Dated August 29, 1914.—Geoffrey Moore Cowper; William Brodie Gurney Angus, M.B.; Lawrence Tweedie Stewart, M.B.; Matthew White, M.B.; Alexander Lundie, M.B.; John Fulton Barr, M.B.; Martin Richardson, M.B.; Percy Edward Adams, M.D.

Dated August 31, 1914.—George Allman Bridge, M.B.; Ralph Johnson Tait, M.B.; Robert William Walter Vaughan, M.B.; John Macpherson Johnston, M.B.; Robert Frew Young, M.B.; Douglas Benham Spence; Herbert Cubitt Lucey, M.D.; Walter Justice Paramore.

Dated September 1, 1914.—Archibald John Gilchrist; John Percival Charles, M.B.; John Higgins; William Wilson Ingram, M.B.; Edmund Basil Jardine; Roy Russell Kerr, M.B.; David Anderson Laird, M.B.; John Gillies Priestly, M.B.; Henry Albert Ronn, M.B.; Aubrey William Venables; Gerald Whittington, M.B.; George Thomas Whyte, F.R.C.S.I.

Dated September 2, 1914.—Percy Northcote, M.B.

Dated September 6, 1914.—William Joseph Maloney, M.D., F.R.C.S.Edin.

Dated September 7, 1914.—James Cowie Dick, M.B.; Douglas Gordon Evans, M.B.; Charles Cochrane Iles, M.D.

Dated September 8, 1914.—Frank Griffith, M.B.

Dated September 9, 1914.—Nigel Philip Boulton, M.B.; Evan Hugh Jones, M.B.; Cyril Douglas Faulkner; Charles Lyon Herklots; Geoffrey Duncan Harding, M.B.; Douglas Macinnes Hunter, M.B.: John Marsters Mitchell, M.B.; John Mowat, M.B.; John Murray Moyes, M.B.; Aneurin Evan Roberts, M.B.; Francis Charles Robbs; Thomas Holmes Ravenhill, M.B.; Augustus Whitehorn Addinsell, M.B.

Dated September 10, 1914.—William Wilkie Deans; John Alban Andrews, M.B.; John Stanley Arkle, M.B.; Hugh John Couchman, M.B.; Edward Gordon, M.B.; Bernard George Gutteridge; Frank Wilson Harlow, M.B.; George Bedingfield Holroyde; Reginald Saint Alban Heathcote, M.B.; Gavin Dalzell McLean, M.B.; Donald MacIntyre, M.B.; Louis Augustus Moran; Samuel Edward McClatchey, M.B.; Matthew William Baillie Oliver, M.B., F.R.C.S.; Henry William Parnis, M.B.; Gavin Stiell; Richard Henry Stevens; Edward Seelley, M.B.; Frederick Edward Tillyard, M.B.; Hill Wilson White, M.B.; Gerald Douglas Hamilton Wallace; Cuthbert Hastings Attenborough, M.B.; Harold James Storrs Morton; Reginald Heber Leigh; Edward Sancton Walls; George Martin Chapman, M.B.; Alfred Maurice Thomson, M.B.

Dated September 11, 1914.—James Bethune Scott, M.B.,; John Phimister Mitchell, M.D.; Ronald Gordon John McEntire, M.B.; Edward Claude Linton; John Prosser Davies, M.B.; David William John; Reginald George Abrahams, M.B.; Robert Marshall Allan, M.B.; Percy Webber Black; Bagot Neptune Blood; James Harding Barry; Alexander Ernest Chisholm, M.B., F.R.C.S.Edin.; Claud Norman Coad, M.B.; George Dunluce Eccles; John Morley Glasse, M.B.: John Henry Graham Hunter, M.B.; Alexander William Hendry, M.B.; Richard Arthur Jones; George Harold Lunan, M.B.; John Richardson Marrack, M.B.; Benjamin Bell Noble, M.B.; Thomas Bourne-Arice; Robert Edward Roberts, M.B. Robert Cecil Robertson, M.B.; Philip Smith; Wilfred Archer Sneath, M.B., F.R.C.S.; Walter Biggar Bannerman; William Edward Macaulay Armstrong, M.D.; Lanyon Edward Owen.

Dated September 12, 1914.—William Lumley; George Alfred Gates, M.D.; Daniel Jenkins Thomas, M.D.; William Kennedy-Taylor.

Dated September 14, 1914.—Gwilym James; Henry Rylands Knowles, M.B.; Thomas Lewis Ingram; Charles Edward Reckitt; James Littleton Lawry, M.D.; Walter Henry Swaffield, M.D., F.R.C.S.Edin.; John Ellwood Leonard Keyes, M.B.; Maurice Nicoll, M.B.; Vincent Glendinning, F.R.C.S.

Dated September 15, 1914.—Samuel Christopher Reeve Flaxman; James Mill Renton, M.B., F.R.C.S.Edin.; Allan Coulter Hancock; John Joseph Aloysius Sherry, J.P.; Ernest Charles Lindsay, M.B., F.R.C.S.; George Ernest Neligan, M.B., F.R.C.S.; Herbert Arnold Lake.

Dated September 16, 1914.—Frederick Sadleir Brereton, late Captain, R.A.M.C.; John McIntosh Morgan, M.B.; James McTurk; Herbert Francis Woolfenden, M.D., F.R.C.S.; James Kirker; John Stanley Lloyd, M.B.; William Neave Kingsbury; George William Lloyd, M.B.; Herbert Jack Rawson; Ernest Stratford: Richard Reid Kirkwood Paton, M.B.; Claude Hebden Barker Booth; George Ernest Beaumont, M.B.; Patrick Cagney, M.B.; James David Grahame Stewart, M.B.; Edgar Fletcher Edmunds, M.B.; Stanley Parke Stoker, M.B.; Harold Garnett Janion; Russell Facey Wilkinson; Oliver Cuff Link, M.B.; Ernest Edwin Holden; Eustace Couper Black, M.B.; William Griffith, M.B.; Charles St. Aubyn Vivian.

Dated September 17, 1914.—Richard Frank Bolt; Daniel Stirling Cooper, M.B.; William Claude Horton, M.B., F.R.C.S.Edin.; Cecil Meredyth Jones, M.B.; Richard Bertram Johnson; Alfred Charles Jepson; William Hilton Parry, M.B.; Hugh Pierce, M.D.; James Henry Paterson, M.B.; Henry Cecil Douglas Miller, M.B.

Dated September 18, 1914.—James Wilson, M.B., F.R.C.S.Edin.; Alfred Joseph Clark, M.D.; Geoffrey Marshall, M.B.; Bernard Grellier.

Dated September 19, 1914.—Frederick Buick McCarter, M.B,; Valentine Cleeve Martyn; David Young Buchanan, M.B.; Emanuel Prinski Scott; Edward Leonard Puddicombe; Edward Hamilton; Murdoch Mann Rodger, M.D.; James Randolph Gyllencrentz; George Arthur Spear; Henry Constantine Woodyatt; William Ainslie, M.D., F.R.C.S.Edin.; Albert Turner; Ralph George Dainty.

Dated September 19, 1914.—Captain Ryder Percival Nash, 2nd Eastern General Hospital, Royal Army Medical Corps, Territorial Force; George Victor Bakewell, M.B.; Frederick Francis Middleweek.

Dated September 20, 1914.—Gideon Walker, M.B.; John Ferguson Smith, M.B.; William Moodie, M.D.; Thomas Howard Body.

Dated September 21, 1914.—Andrew Currie, M.B.; Robert Hannah, M.B.; Frederick George Sharpe, F.R.C.S.; Stanley Ritson, F.R.C.S.; Alexander Lindsay, M.B.; William Henry Sutcliffe, M.B.; Roy Warren Russell-Jones, M.B.; Leslie Henderson Skene, M.B.; Trevor Hamilton Wilkins; Ievan Herbert Powell, M.B.; Basil Eustace Moss, M.B.; Alexander Lindsay Aymer, M.B.

Dated September 21, 1914.—Lewis Hay Frederick Thatcher, M.D.; Isaac Bertram D'Olier, M.D.; Octavius de Burgh Marsh, M.B.

Dated September 23, 1914. Percy Gully; Bartholomew James Hackett, M.B.

Lieutenant Reginald Fisher to be Captain, dated September 27, 1914.

The undermentioned Cadets and ex-Cadets of the Officers Training Corps to be Lieutenants:—

Dated August 5, 1914.—John Duncan Steele; Samuel Durham Lodge.

Dated August 6, 1914.—Alan Francis Grimbly.

Dated August 7, 1914.—John James Digges La Touche; Francis Hennessey Goss; George Vincent Stockdale, M.B.; Charles Gordon Todd, dated August 8, 1914.

Dated August 7, 1914.—John Aloysius Musgrave; Harry Manwaring Holt.

Dated August 8, 1914.—Charles Henry Brennan; William Allan Nesbitt Fox; William Kealty Campbell.

Dated August 9, 1914.—William Hunt; Norman Alexander Martin; Harold Larcom Mooney; John Philip Macnamara; Joseph Crawford Alfred McCalden, M.B.

Dated August 10, 1914.—Frank Cecil Harrison; James Purdie, M.B.

Dated August 11, 1914.—Geoffrey Say Trower; Archibald Browning Mitchell, M.B.; Osborne Henry Mavor, M.B.; Matthew Wallace Paterson; Robert George Bannerman, M.B.

Dated August 12, 1914.—John Henry Magoveny, M.B.; Alexander Glen, M.B.; Peter Williams Edwards.

Dated August 13, 1914.—James Carruthers Young, M.D.; Samuel Knibb Young, M.B.; Cyril James Berkeley Way; Frederick Roland Studdert Shaw; Ronald Stewart, M.B.; Hugh Alderson Fawcett; Edmond Robinson.

Dated August 14, 1914.—Alexander Keith Robb; Charles Alexander Whitfield; Robert Clement Burke Ramsay.

Dated August 16, 1914.—Richard Brendan Buchanan; George Ronald Waller, Kenneth Duncan Murchison, M.B.; Hugh George Trayer, M.B.; John James Balmanno Edmond; Arthur Cyril Bateman.

Dated August 17, 1914.—Alfred Leopold Robertson, M.B.; William Walford Salisbury Sharpe; William Charles Bernard Meyer, M.B.; David Stanley Martin; Robert McKinlay.

Dated August 18, 1914.—Charles Norman Gover, M.B.

Dated August 19, 1914.—James Ronald McCurdie, M.B.; Cuthbert Baron, M.B.; Thomas Parr; John Wilson Cannon, M.B.; Thomas Edward Bellingham Beatty; William James Dowling; Alan Alexander Duffus; James Arthur William Cullen.

Dated August 20, 1914.—Charles Bevan Carew Anderson; Frederick George Flood, M.B.; Douglas Morrison Milne Fraser.

Dated August 21, 1914.—John Wright Malcolm; Albert William Darnley Magee; Sidney William Rintoul, M.B.

Dated August 22, 1914.—Clement Lovell, M.D.

Dated August 23, 1914.—Frank Crosbie, M.D.

Dated August 24, 1914.—William Ferguson Wood, M.B.; Edward Richardson Lovell.

Dated August 25, 1914.—Bernard Goldsmith.

Dated August 30, 1914.—Robert Leech Newell.

Dated August 31, 1914.—Frank Sheppard Gillespie, M.B.; Robert Ringrose Gelston Atkins, M.B.; Hamilton Barrett Goulding, M.B.; William Ernest Tyndall, M.B.; George Sydney McConkey, M.B.; Kenneth Kirkpatrick Drury, M.D.; Daniel Dougal, M.D.

LIST OF OFFICERS ROYAL ARMY MEDICAL CORPS MENTIONED IN DESPATCH, DATED OCTOBER 8, 1914, LONDON GAZETTE, OCTOBER 19, 1914.

Amy, Captain A. C.
Babington, Major M. H.
Barefoot, Lieutenant-Colonel G. H.
Beveridge, Lieut.-Col. W. W. O., D.S.O.
Bourke, Major E. A.
Burke, Major B. B.
Clark, Lieutenant-Colonel S. F.
Cummins, Major S. L., M.D.
Fell, Major M. H. G.
Forrest, Major J. V.
Gallie, Major J. S.
Low, Captain N.
Lynden-Bell, Colonel E. H. L.
McNaught, Major J. G.
Moore, Major G. A.
Myles, Major C. D.
O'Donnell, Colonel T. J., D.S.O.
Otway, Captain A. L.
Russell, Lieutenant-Colonel J. J.
Smith, Brevet-Colonel F., D.S.O.
Steel, Major E. B.
Symons, Major F. A.
Waring, Major A. H.
Webb, Major A. L. A.
Woodhouse, Surg.-Gen. (temporary) T. P.
Chopping, Major A.
Cree, Lieutenant-Colonel G.
Dalton, Lieutenant-Colonel C.
Hickson, Colonel S., M.B., K.H.S.
Porter, Colonel R.
Ryan, Major E.
Sawyer, Colonel R. H. S.
Smallman, Major A. B.
Huggan, Lieutenant J. L. (killed).
Shields, Lieutenant H. J. S.
Leckie, Captain M.
Kempthorne, Captain G. A.
Ranken, Captain H. S.
Lewis, Captain S. E.
Birrell, Major E. T. F.
Bourdillon, Lieutenant L. G.
Butler, Major S. G.
Caddell, Captain E. D.
Cowey, Major R. V.
Dolbey, Lieutenant R. V.
Ensor, Major H., D.S.O.
Fielding, Major T. E.
Foster, Major R. L. V.
Goodwin, Major, T. H. J. C., D.S.O.
Grech, Major J.
Hairsine, Lieutenant C. (Special Reserve).
Helm, Lieutenant C.
Hinge, Major H. A.
Hopkins, Lieut. H. L. (Civil Surgeon).
Howells, Lieutenant W. M.
Lathbury, Captain E. B.
Leckie, Captain M.
Lloyd, Major L. N.
McEntire, Captain J. T.
Mitchell, Lieutenant-Colonel L. A.
Morgan, Lieutenant-Colonel J. C.
Murphy, Captain J. F. (Special Reserve).
Nimmo, Captain W. M.
O'Brien-Butler, Captain C. P.
Osburn, Captain A. C.
Preston, Lieutenant R. A.
Profeit, Major C. W.
Sampson, Captain F. C.
Stewart, Captain H.
Ware, Captain G. W. W.
Wyler, Lieutenant (Civil Surgeon).

EXTRACT FROM LONDON GAZETTE, DATED OCTOBER 16, 1914.

Names of non-commissioned officers and men brought forward for special mention by Army Corps Commanders and heads of departments for services rendered from the commencement of the campaign up to the present date.

ROYAL ARMY MEDICAL CORPS.

Amsden, 16002, Serjeant H.
Anderson, 10434, Serjeant-Major H. J.
Bennett, 6630, Lance-Corporal T.
Blair, 17843, Staff-Serjeant A. C.
Burstall, 2406, Private
Chatting, 2226, Corporal F. J.
Coad, 16396, Corporal R. H.
Coggin, 11141, Serjeant-Major T. E.
Cox, Serjeant-Major R. R.
Cuffley, 4158, Private
Fann, 11874, Private H. W.
Gardiner, 12890, Staff-Serjeant J.
Goodwin, 6617, Private R. A.
Hasler, 10659, Serjeant-Major A. T.
Jonas, 12953, Lance-Corporal J.
Leech, 18722, Private
Lockwood, 1116, Serjeant J. W.
Loft, 10166, Serjeant-Major C. R.
Mears, 8722, Private R.
Nicholas, 12485, Serjeant E.
Noble, 19103, Private H. G.
Pettit, 19236, Corporal F. F.
Plume, 17421, Corporal B.
Prince, 1305, Serjeant H. M.
Rayer, 11224, Staff-Serjeant A. T.
Spowage, 11029, Staff-Serjeant A.
Steel, 17568, Quartermaster-Serjeant E.
Stevens, 128, Private G.
Sworn, 7471, Private R. V.
Turner, 8268, Quartermaster-Serj. G.B
Wass, 18189, Lance-Corporal

Officers Killed.

Forrest, Captain F.
Scatchard, Captain T.
Huggan, Lieutenant J. L.
O'Connell, Lieutenant J. F.
Hopkins, Lieut. H. L. (Civil Surgeon).
Crocket, Lieutenant J.
Ball, Lieutenant W. O. W.
Nolan, Captain R. H.
Rintoul, Lieutenant D. W.
Lochrin, Captain M. J.
O'Connor, Captain R. D.
Porter, Lieutenant R. E.

Died of Wounds.

Armstrong, Lieut. A. K. (Civil Surgeon).
Dalton, Lieutenant-Colonel C.
Ranken, Captain H. S.
Leckie, Captain M.
Sheilds, Lieutenant H. J. S.

Drowned.

Wardleworth, Lieutenant D. (Civil Surgeon).

Officers Wounded.

Gibbon, Captain T. H.
McConaghy, Captain W.
Perry, Captain H. M. J.
Holden, Captain C. W.
Painton, Captain G. R.
Wyler, Lieutenant E. J. (Civil Surgeon).
Watson, Lieutenant A.
Fisher, Lieutenant R. (Special Reserve).
Dunbar, Captain B. H. V.
Hamilton, Lieut. J. O. (Special Reserve).
Edmunds, Captain C. T.
Walker, Lieutenant E. R. (Civil Surgeon).
Goodden, Lieut. H. W. (Civil Surgeon).
Leahy, Captain M. P.
Wetherell, Captain M. C.
Ryan, Major E.
Hayman, Lieut. S. R. (Special Reserve).
Dillon, Lieut. H. de L. (Civil Surgeon).
Stewart, Captain P. S.
Chisnall, Lieutenant G. H.
Lister, Lieutenant W. A. (Civil Surgeon).
Grant, Lieutenant G. R.
Thatcher, Lieutenant F. G.
O'Driscoll, Lieut. C. A. (Civil Surgeon).

EXTRACT FROM THE "LONDON GAZETTE" OF NOVEMBER 3, 1914.

The President of the French Republic has bestowed the Decoration of the Legion of Honour on the undermentioned officers, with the approval of His Majesty the King, for their gallantry during the operations between August 21 and 30, 1914.

CROIX D'OFFICIER.

Major S. L. Cummins, M.D., Royal Army Medical Corps.

CROIX DE CHEVALIER.

Captain S. E. Lewis, M.B., Royal Army Medical Corps.
Captain J. T. McEntire, M.B., Royal Army Medical Corps.
Captain H. S. Ranken, M.B., Royal Army Medical Corps (killed in action).

MERITORIOUS SERVICE REWARD.

A reward for distinguished and meritorious service of £100 per annum has been awarded to Surgeon-Major-General Sir Alexander Frederick Bradshaw, K.C.B., K.H.P., retired pay, late A.M.S., *vice* Surgeon-General Sir A. D. Hume, V.C., K.C.B., deceased, from August 10, 1914, inclusive.

NOTES FROM SIMLA.—Major H. O. B. Browne-Mason, R.A.M.C., Assistant Director of Medical Services (British Service), temporary, writes as follows, dated Simla, September 16, 1914: "*Appointments.*—Major H. O. B. Browne-Mason, R.A.M.C., has been appointed Assistant Director of Medical Services (British Service), temporarily, *vice* Lieutenant-Colonel A. P. Blenkinsop, R.A.M.C., who has joined the War Office for duty.

"The undermentioned officers have been appointed to the command of the station hospitals shown against them :—

"Lieutenant-Colonel A. T. I. Lilly, Station Hospital, Karachi.
"Lieutenant-Colonel H. E. Cree, Station Hospital, Meerut.
"Major R. L. Argles, Station Hospital, Mount Abu.
"Major G. F. Sheehan, Station Hospital, Jutogh.

"*Specialists.*—The following officers have been appointed specialists in the subjects noted against them :—

"Captain F. H. M. Chapman, electrical science, 7th (Meerut) Division.
"Captain G. S. Wallace, prevention of disease, Brigade Laboratory, Secunderabad.
"Captain J. D. Kidd, electrical science, 9th (Secunderabad) Division.
"Lieutenant H. C. Todd, advanced operative surgery, 7th (Meerut) Division.
"Lieutenant J. H. M. Frobisher, advanced operative surgery, 3rd (Lahore) Division."

TERRITORIAL FORCE.

YEOMANRY.

BEDFORDSHIRE.

Surgeon-Captain Henry Skelding, M.B., to be Surgeon-Major, dated August 10, 1914.

OXFORDSHIRE (QUEEN'S OWN OXFORDSHIRE HUSSARS).

Surgeon-Lieutenant Archibald H. Hogarth to be Surgeon-Captain.

ROYAL FIELD ARTILLERY.

1ST WELSH HOWITZER BRIGADE.

Surgeon-Major David A. Davies, M.B., resigns his commission on account of ill-health, and is granted permission to retain his rank and wear the prescribed uniform, dated September 19, 1914.

ROYAL ARMY MEDICAL CORPS.

Eastern Mounted Brigade Field Ambulance.—Captain William Archibald, M.D., to be Major, dated September 5, 1914; Harold Martin McCulloch Coombs, M.B., to be Lieutenant, dated August 6, 1914.

North Midland Mounted Brigade Field Ambulance.—The undermentioned to be Lieutenants, dated September 5, 1914: John Brentnall Stanley; Lionel Alfred Dingley.

1st South Western Mounted Brigade Field Ambulance.—Ivan Cochrane Keir, M.D., to be Lieutenant, dated September 5, 1914; William Cliff Hodges to be Lieutenant (to be supernumerary), dated September 16, 1914; Lieutenant William C. Hodges is absorbed into the establishment, dated September 16, 1914.

Yorkshire Mounted Brigade Field Ambulance.—Captain George H. L. Hammerton to be Major, dated August 20, 1914.

London Mounted Brigade Field Ambulance.—Herbert Eldon Roaf to be Lieutenant, dated September 19, 1914.

1st South Midland Mounted Brigade Field Ambulance.—Captain Thomas Henderson Forrest, M.B., to be Major, dated September 19, 1914; Robert Wallace Aitken, M.B., to be Lieutenant, dated September 30, 1914.

1st South Midland Field Ambulance.—The appointment of Lieutenant Albert E. P. McConnell, M.B., which appeared in the *London Gazette* of September 4, 1914, is cancelled.

2nd South Midland Field Ambulance.—Albert Edward Peel McConnell, M.B., to be Lieutenant, dated September 5, 1914.

South Wales Mounted Brigade Field Ambulance.—Herbert Massingberd Pentreath to be Lieutenant, dated October 10, 1914.

Welsh Border Mounted Brigade Field Ambulance.—John Brown Yeoman, M.D., F.R.C.S., to be Captain, dated August 5, 1914.

1st Highland Field Ambulance.—William Henry Eden Brand, F.R.C.S.Edin., to be Lieutenant, dated October 7, 1914; Captain John Hector Stephen, M.B., and Captain Cuthbert D. S. Agassiz, M.B., from attached to units other than medical units, to be Captains, dated September 7, 1914; Lieutenants James A. Morris, M.B., and James E. G. Thomson, M.B., from attached to units other than medical units, to be Lieutenants, dated September 7, 1914.

2nd Highland Field Ambulance.—Lieutenant-Colonel Francis Kelly, M.D., from the Highland Clearing Hospital, to be Lieutenant-Colonel, dated September 1, 1914; Captain David Rorie, M.D., from the Highland Clearing Hospital, to be Captain, dated September 1, 1914; Quartermaster and Honorary Lieutenant Alexander Gibbon, from the Highland Clearing Hospital, to be Quartermaster, with the honorary rank of Lieutenant, dated September 1, 1914; Lieutenant Charles Cameron, M.B., to be Captain, dated October 1, 1914; Hawtrey William Browne, M.B., to be Lieutenant, dated September 30, 1914.

3rd Highland Field Ambulance.—Edwin Archibald Bell to be Lieutenant, dated September 24, 1914; Lieutenant Edwin Archibald Bell, to be Transport Officer, *vice* Captain John Tait, who has vacated the appointment; Herbert Stuart Cleghorn to be Quartermaster, with the honorary rank of Lieutenant, dated September 24, 1914; John Morrison Milne to be Lieutenant, dated October 15, 1914.

Highland Clearing Hospital.—Lieutenant-Colonel Alexander Ogston, M.B., from the 2nd Highland Field Ambulance, to be Lieutenant-Colonel, dated September 1, 1914; Quartermaster and Honorary Lieutenant James M. Munro, from the 2nd Highland Field Ambulance, to be Quartermaster, with the honorary rank of Lieutenant, dated September 1, 1914.

3rd Lowland Field Ambulance.—The following announcement is substituted for that which appeared in the *London Gazette* of August 28, 1914: Archibald Cotterell McMaster, M.B., to be Lieutenant, dated August 10, 1914. The following announcement is substituted for that which appeared in the *London Gazette* of August 21, 1914: James Abbey Henderson, M.B., to be Lieutenant, dated August 10, 1914.

3rd East Lancashire Field Ambulance.—Quartermaster and Honorary Lieutenant James E. H. Anderton, from East Lancashire Clearing Hospital, to be Quartermaster, with the honorary rank of Lieutenant, dated September 30, 1914.

1st Welsh Field Ambulance.—Major Evelyn John Robert Evatt, M.B., from the Unattached List for the Territorial Force to be Major, dated September 30, 1914; Lieutenant-Colonel John William Davies resigns his commission, and is granted permission to retain his rank and wear the prescribed uniform, dated September 30, 1914

2nd Welsh Field Ambulance.—Captain Charles R. White, M.B., to be Major, dated August 5, 1914; Lieutenant Arthur C. Devereux, M.B., to be Captain, dated August 5, 1914.

1st Northumbrian Field Ambulance.—Captain James P. Milne to be Major, dated August 22, 1914.

3rd Northumbrian Field Ambulance.—The undermentioned Captains to be Majors, dated September 10, 1914: Percy R. Ash; William A. Thompson. Arthur Charles Mears Savege, M.B., to be Lieutenant, dated June 22, 1914.

2nd West Riding Field Ambulance.—Wallace Wright Adamson, M.B., to be Lieutenant, dated September 10, 1914.

3rd Home Counties Field Ambulance.—Captain Stanley A. Coad to be Major, dated September 19, 1914.

1st East Lancashire Field Ambulance.—Captain Gordon William Fitzgerald, M.D., to be Major, dated September 19, 1914; Lieutenant William Robert Douglas, M.B., to be Captain, dated September 19, 1914. The date of appointment of the undermentioned Lieutenants is as now shown, and not as stated in the *London Gazette* of August 21, 1914: Alexander Morrison Mackay, M.B., dated August 5, 1914; John Morley, dated August 5, 1914; Frederick Stanley Bedale, dated August 8, 1914.

2nd East Lancashire Field Ambulance. — The undermentioned Captains to be Majors, dated September 19, 1914: George Ashton, M.D.; Harry Washington Pritchard. The date of appointment of the undermentioned Lieutenants is as now shown, and not as stated in the *London Gazette* of September 4, 1914: George Battersby Jameson, dated August 12, 1914; Frederick Colin Bentz, M.B., dated August 15, 1914.

3rd East Lancashire Field Ambulance.—Captain Edward Harvie Cox, M.B., to be Major, dated September 19, 1914; Lieutenant John Knowles Lund to be Captain, dated September 19, 1914; Oliver Henry Blacklay, M.D., to be Lieutenant, dated September 1, 1914. The date of appointment of the undermentioned Lieutenants is as now shown, and not as stated in the *London Gazette* of August 21, 1914: Frank Kershaw Tomlinson, M.B., dated July 6, 1914; John Cecil Jefferson, dated August 4, 1914; Nicholas Hopkins Henry Haskins, M.B., F.R.C.S., dated August 9, 1914.

3rd South Midland Field Ambulance.—Lieutenant George S. Williamson to be Captain, dated September 23, 1914.

1st Northumbrian Field Ambulance.—Captain John M. Gover, M.B., to be Major, dated August 22, 1914.

3rd West Riding Field Ambulance.—William Barnsley Allen, M.B., to be Lieutenant, dated August 8, 1914; Robert Alexander Stark, M.B., to be Lieutenant, dated August 8, 1914; Major John W. Stokes to be Lieutenant-Colonel, dated August 31, 1914.

3rd North Midland Field Ambulance. — The undermentioned Captains to be Majors, dated September 19, 1914: Andrew Edward Holder, M.B., Charles Algernon Stidston, M.D.

3rd South Midland Field Ambulance.—Captain James S. Mather, M.B., to be Major, dated September 19, 1914.

3rd Wessex Field Ambulance.—Captain Robert Henry, from attached to units other than medical units, to be Captain, dated October 1, 1914. The undermentioned Lieutenants to be Captains, dated September 4, 1914: Aurelius Victor Maybury, M.B.; Edgar C. Plummer.

1st West Riding Field Ambulance.—Major Alexander D. Sharp to be Lieutenant-Colonel, dated August 31, 1914.

1st East Anglian Field Ambulance.—Francis Ward, M.D. (late Surgeon-Captain, 1st Volunteer Battalion, Suffolk Regiment), to be Captain, dated October 8, 1914. The undermentioned Captains to be Majors, dated September 26, 1914: Gerald Moore Hetherington; Octavius Roberts Ennion.

1st Highland Field Ambulance.—The undermentioned to be Lieutenants, dated October 8, 1914: Daniel McDonald Grant, M.B.; James Stewart McConnachie, M.B.

1st Home Counties Field Ambulance.—Captain Joseph Ward to be Major, dated October 8, 1914; Arthur Thomas Falwasser to be Captain, dated October 14, 1914; Lieutenant Thomas Henry Peyton to be Captain, dated September 3, 1914; William Brooks Keith, M.B., to be Lieutenant, dated September 21, 1914.

2nd Home Counties Field Ambulance.—Captain William H. Flint to be Major, dated October 7, 1914; Lieutenant Bernard R. Billings to be Captain, dated September 9, 1914.

1st Welsh Field Ambulance.—Major J. Howard-Jones, M.B., from attached to units other than medical units, to be Major, dated August 5, 1914.

3rd East Anglian Field Ambulance. — Lieutenant William Reginald Margetts Turtle, M.B., from attached to units other than medical units, to be Lieutenant, dated September 16, 1914.

2nd Home Counties Field Ambulance.—Herbert Stanley Hollis, M.B., to be Captain, dated September 16, 1914.

1st North Midland Field Ambulance.—Major Edwin A. Wraith to be Lieutenant-Colonel, dated September 16, 1914. The undermentioned Captains to be Majors, dated August 1, 1914: Thomas Ashley Barron; Frederick Russell Bremner, M.B.

2nd North Midland Field Ambulance.—Joseph Francis Dixon, M.D. (late Captain 10th New Zealand Rifles (mounted)), to be Captain, dated September 16, 1914.

2nd South Midland Field Ambulance.—The undermentioned Captains to be Majors, dated September 16, 1914: William Algernon Louis Holland; John Henry Hobling.

2nd West Riding Field Ambulance.—Samuel Sowray Greaves to be Lieutenant, dated September 16, 1914.

1st Wessex Field Ambulance. — The undermentioned to be Lieutenants, dated September 16, 1914: George Downing Perry; Robert Burgess.

2nd East Lancashire Field Ambulance.—Captain William F. Munro, M.B., is seconded, dated August 4, 1914; Captain Alexander Callam is seconded, dated September 5, 1914; Frederick Colin Bentz, M.B., to be Lieutenant, dated September 5, 1914; George Battersby Jameson to be Lieutenant, dated September 5, 1914; Frederick Jeeves to be Lieutenant, dated September 9, 1914.

3rd East Lancashire Field Ambulance.—William Pike Ferguson, M.D., to be Lieutenant, dated September 9, 1914.

3rd West Lancashire Field Ambulance.—Francis Statham Fletcher, M.B., to be Lieutenant, dated September 9, 1914. The undermentioned to be Lieutenants, dated September 5, 1914: Adam Annand Turner, M.B.; Leonard Barron Baird.

1st London (City of London) Field Ambulance.—Captain Charles S. Brebner, M.D., from the Territorial Force Reserve, to be Captain, dated September 9, 1914.

1st East Anglian Field Ambulance.—Gilbert Clement Gray to be Lieutenant, dated August 10, 1914.

2nd Wessex Field Ambulance.—Captain Richard P. Ryan, from the list of officers attached to units other than medical units, to be Captain, dated September 12, 1914; Henry William Spaight to be Lieutenant, dated September 5, 1914.

1st Lowland Field Ambulance.—Lieutenant William F. Mackenzie, M.B., to be Captain, dated August 18, 1914.

1st South Midland Field Ambulance.—The date of appointment as Lieutenants in the 1st South Midland Field Ambulance of William Bowater and Morris Wilks, M.B., is August 5, 1914, and not as stated in the *London Gazette* of August 18, 1914. The undermentioned to be Lieutenants, dated September 5, 1914: Albert Edward Peel McConnell, M.B.; Cyril Randolph Wallace.

3rd East Lancashire Field Ambulance.—The undermentioned Lieutenants to be seconded: Kingsmill W. Jones, M.D., dated August 4, 1914; William J. Reid, M.B., dated August 5, 1914; Charles Bertram Marshall, M.B., to be Lieutenant, dated September 5, 1914.

1st West Lancashire Field Ambulance.—The undermentioned to be Lieutenants, dated August 8, 1914: James Walker, M.B.; Thomas Courtenay Clarke, M.B.

5th London Field Ambulance.—George Scott, M.B., to be Lieutenant, dated September 5, 1914.

6th London Field Ambulance.—The undermentioned to be Lieutenants, dated September 5, 1914: Henry Bryan Frost Dixon, M.B.; Alfred Morgan Hughes; Frederick Lucien Golla, M.B.

1st Northumbrian Field Ambulance.—Francis Metcalfe, M.B., to be Lieutenant, dated September 5, 1914.

1st Welsh Field Ambulance.—Donald Macaulay, M.B., to be Lieutenant, dated September 5, 1914; Charles Bernard Francis to be Transport Officer with the honorary rank of Lieutenant, dated September 5, 1914.

3rd Welsh Field Ambulance.—Captain David B. Chiles-Evans is seconded. dated August 8, 1914.

2nd West Riding Field Ambulance.—Hubert Wallace Symons, M.B., to be Lieutenant, dated September, 5, 1914.

3rd West Riding Field Ambulance.—John Pearson Matthews, M.B., to be Lieutenant, dated September 5, 1914.

1st East Lancashire Field Ambulance.—The undermentioned to be Lieutenants, dated September 5, 1914: Thomas Hayhurst, M.B.; Robert Steele Young, M.B.; John Buckley (late Surgeon-Lieutenant, 2nd Volunteer Battalion, The Sherwood Foresters, Nottinghamshire and Derbyshire Regiment).

3rd London General Hospital.—The undermentioned to be Lieutenants, dated August 20, 1914: George Harvey Duder Webb; John St. Andrew Titmas; Harry Audley Lucas; Edward Smeed.

1st London (City of London) General Hospital.—Lieutenant-Colonel Sir Anthony A. Bowlby, Knt., C.M.G., F.R.C.S., to be seconded, dated September 23, 1914. List of officers whose services will be available on mobilization: Major Howard H. Tooth, C.M.G., M.D., to be Lieutenant-Colonel, dated September 2, 1914. The undermentioned Captains to be Majors, dated September 2, 1914: Herbert M. Fletcher, M.D.; Robert C. Bailey, M.B., F.R.C.S.; John H. Drysdale, M.D.; Louis B. Rawlings, M.B., F.R.C.S. The undermentioned to be Captains, dated September 2, 1914: William Henry Girling Ball, F.R.C.S.; James Hugh Thursfield, M.D.; Harold William Wilson, M.B., F.R.C.S.; William Bradshaw Ainger, F.R.C.S.; Herbert Drayton Clementi-Smith, M.B.; Richard Gill, M.B., F.R.C.S. The undermentioned to be Captains, dated September 5, 1914: Henry Gaskin Boyle; Reginald Cheyne Elmslie, F.R.C.S.; William Douglas Harmer, M.B., F.R.C.S.; Joseph Frederick Trewlby; Herbert Williamson, M.B., F.R.C.P.; Alfred Bernard Pavey Smith; George Harold Lawson Whale, M.D., F.R.C.S.; Lionel Gordon Crossman, M.B.; Martin Wright Kidman Bird; Frank Atcherley Rose. The undermentioned to be Lieutenants, dated September 5, 1914, and not as stated in the *London Gazette* of September 4, 1914: Alfred Bernard Pavey Smith; Lionel Gordon Crossman, M.B.; Martin Wright Kidman Bird; Arnold Walmsley Stott to be Lieutenant.

2nd London (City of London) General Hospital.—Lieutenant-Colonel George H. Makins is seconded, dated September 16, 1914; Major Charles W. M. Moultin to be Lieutenant-Colonel, dated September 16, 1914; Robert James Probyn-Williams, M.D., to be Captain, dated September 19, 1914.

2nd London General Hospital.—The undermentioned to be Lieutenants: Cyril Eaton Petley, dated September 11, 1914; Leonard Milton, dated September 12, 1914; Herbert Sharpe, dated September 17, 1914; Hubert John Burgess Fry, dated September 20, 1914.

1st Southern General Hospital.—Leonard Gregory Parsons to be Captain, dated September 30, 1914.

4th London General Hospital.—Major Stanley Boyd, M.B., F.R.C.S., to be Lieutenant-Colonel, dated September 9, 1914. The date of appointment of Captain Reginald Oliver Sibley, M.D., is August 5, 1914, and not as stated in the *London Gazette* of September 1, 1914. Reginald Oliver Sibley to be Captain, dated September 2, 1914.

5th Southern General Hospital.—The announcement which appeared in the *London Gazette* of August 21, 1914, notifying the resignations of Lieutenant Colonel and Honorary Surgeon-Colonel George G. Sparrow and Lieutenant-Colonel John R. S. Robertson, M.B., is cancelled. The date of appointment of Lieutenant-Colonel John Kyffin is August 6, 1914, and not as stated in the *London Gazette* of September 29, 1914.

East Anglian Clearing Hosptal.—The date of appointment of Quartermaster and Honorary Lieutenant John W. Price, is August 14, 1914, and not as stated in the *London Gazette* of August 25, 1914.

2nd Eastern General Hospital.—Lieutenant Herbert J. Walker, F.R.C.S.Edin., to be Captain, dated October 1, 1914.

3rd Northern General Hospital.—John Henry Cobb, M.B., to be Captain, dated October 1, 1914. The undermentioned to be Captains, dated September 5, 1914: Arthur Gurney Yates, M.D.; John Black Ferguson Wilson, M.B., F.R.C.S.; Henry Cecil Snell.

5th Northern General Hospital.—Major Louis K. Harrison, M.B., to be Lieutenant-Colonel, dated August 6, 1914.

3rd Southern General Hospital.—Major Walter Tyrell Brooks, M.B., to be Lieutenant-Colonel, dated September 5, 1914. Captain Robert E. Humphry is seconded, dated September 19, 1914. Captain Robert Long Gamlen (Indian Medical Service) to be temporary Captain, dated September 5, 1914.

4th Northern General Hospital.—Herbert Cecil Barlow, to be Captain, dated September 5, 1914.

4th Scottish General Hospital.—The undermentioned to be Captains, dated September 5, 1914: Alexander John Archibald, M.D.; William Herbert Brown, M.D.

4th Southern General Hospital.—The undermentioned to be Captains, dated September 5, 1914: Cornelius Frederick Glinn; Guy Stanley Earl, M.D.

5th Southern General Hospital.—Major John Kyffin, from the list of officers available for service on mobilization, to be Lieutenant-Colonel on the permanent personnel, dated September 5, 1914. The following announcement is substituted for that which appeared in the *London Gazette* on September 4, 1914: Major John Kyffin to be Lieutenant-Colonel, dated September 5, 1914; Captain John T. Leon, M.D., is seconded, dated September 12, 1914.

1st Eastern General Hospital.—The undermentioned to be Captains, dated September 9, 1914: John Foster Gaskell, M.D.; Dalton Mallam; Edward John Yelverton Brash.

2nd London (City of London) General Hospital.—Charles Archibald Lees to be Captain, dated September 9, 1914; Walter Goldie Howarth to be Captain, dated September 26, 1914.

3rd London General Hospital.—Dennis Embleton to be Captain, dated September 23, 1914.

4th London General Hospital.—The undermentioned Lieutenant-Colonels are seconded, under the conditions of paragraph 112 of the Territorial Force Regulations, dated September 9, 1914: Sir William W. Cheyne, Bart., M.B., F.R.C.S.; George R. Turner, F.R.C.S. The undermentioned to be Captains: David Henriques de Souza, dated August 26, 1914; Arthur John Jex-Blake, M.B., F.R.C.P., dated August 27, 1914; Ivor Gordon Back, M.B., F.R.C.S., dated August 27, 1914; Claude Howard Stanley Frankau, M.B., F.R.C.S., dated August 28, 1914; Captain Ernest Rock Carling, M.B., F.R.C.S., is restored to the establishment, September 5, 1914; Captain William Turner, M.B., F.R.C.S., is restored to the establishment, dated September 5, 1914.

2nd Western General Hospital.—Major Ernest S. Reynolds, M.D., to be Lieutenant-Colonel, dated September 9, 1914. The undermentioned to be Captains, dated September 9, 1914: Wilson Harold Percy Hey, M.B., F.R.C.S.; John Philip Buckley; Frank Edward Tylecote, M.D.; Donald Elms Core, M.D.; Sidney Rawson Wilson, M.B., F.R.C.S.Edin.

2nd Eastern General Hospital.—Major James A. Rooth to be Lieutenant-Colonel, dated October 21, 1914; Lieutenant Hugh M. Galt, M.B., from attached to units other than medical units, to be Captain, dated October 21, 1914. The date of appointment of Howard Harcourt Ross as Quartermaster is August 4, 1914, and not as stated in the *London Gazette* of August 28, 1914.

1st London General Hospital.—The date of promotion of Lieutenant-Colonel H. H. Tooth, C.M.G., M.D., is August 22, 1914, and not as stated in the *London Gazette* of September 1, 1914.

1st Northern General Hospital.—Major Thomas Gowans, M.B., to be Lieutenant-Colonel, dated August 6, 1914: Sydney James Clegg, M.B., to be Captain, dated September 30, 1914.

2nd Southern General Hospital.—Frederick Cecil Nichols to be Captain, dated September 23, 1914; Quartermaster and Honorary Lieutenant Frederick C. Nichols resigns his commission, dated September 23, 1914; Archibald Leonard Taylor to be Quartermaster with the honorary rank of Lieutenant, dated September 23, 1914.

3rd London General Hospital.—Captain James E. Lane, F.R.C.S., is seconded, dated September 16, 1914.

3rd Northern General Hospital.—Thomas Bernard Mouat, M.D., F.R.C.S., to be Captain, dated September 16, 1914.

5th Northern General Hospital.—Officers whose services will be available on mobilization: Thomas Charles Clare to be Captain, dated August 30, 1914.

2nd London Sanitary Company.—Lieutenant Percy N. Cave to be Captain, dated September 25, 1914.

Eastern Mounted Brigade Field Ambulance. — John Morgan O'Meara to be Lieutenant, dated October 10, 1914.

1st East Anglian Field Ambulance.—George James Leask to be Quartermaster, with the honorary rank of Lieutenant, dated October 15 1914; Harry Harris to be Transport Officer, with the honorary rank of Lieutenant, dated October 15, 1914.

3rd East Anglian Field Ambulance.—Frederick Claude Kempson, M.B., to be Lieutenant, dated October 15, 1914.

1st Highland Field Ambulance.—The undermentioned to be Lieutenants, dated October 15, 1914: Charles Alexander Whyte; George Davidson, M.D.; James Dickie to be Quartermaster, with the honorary rank of Lieutenant, dated October 15, 1914.

3rd West Riding Field Ambulance.—The undermentioned Captains to be Majors: James Mackinnon, dated August 6, 1914; Ernest Frederick Finch, dated August 6, 1914; Charles Graham Murray, dated September 9, 1914; Lieutenant William N. W. West-Watson, M.D., from attached to units other than medical units, to be Lieutenant, dated October 10, 1914.

Wessex Clearing Hospital.—Major Clarence I. Ellis, M.D., to be Lieutenant-Colonel, dated October 10, 1914.

1st West Riding Field Ambulance.—Captain Harry B. Sproat, M.D., from attached to units other than medical units, to be Captain, dated August 10, 1914.

2nd Northumbrian Field Ambulance.—Angus Ferens to be Transport Officer, with the honorary rank of Lieutenant, dated October 21, 1914.

1st West Lancashire Field Ambulance.—The undermentioned Captains to be Majors, dated October 15, 1914: Creighton H. Lindsay, M.D.; Adam P. H. Simpson.

1st Northumbrian Field Ambulance.—Roger Errington, M.B., to be Lieutenant, dated October 15, 1914.

2nd Northumbrian Field Ambulance.—Valentine Hutchinson Wardle (late Cadet, Durham University Contingent, Senior Division, Officers Training Corps) to be Lieutenant, dated October 15, 1914.

1st East Lancashire Field Ambulance.—Lieutenant (Transport Officer) George Robinson Wattleworth, from Manchester Companies, Royal Army Medical Corps (Volunteers), to be Transport Officer, with the honorary rank of Captain, dated August 1, 1914.

2nd East Lancashire Field Ambulance.—Lieutenant (Transport Officer) Charles Gordon Stoddart, from the Manchester Companies, Royal Army Medical Corps (Volunteers), to be Transport Officer, with the honorary rank of Captain, dated August 1, 1914.

3rd Northumberland Field Ambulance.—Lieutenant George H. Watson, from attached to units other than medical units, to be Lieutenant, dated October 7, 1914.

Northumbrian Clearing Hospital.—Frank Castle Fletcher to be Quartermaster, with the honorary rank of Lieutenant, dated September 19, 1914.

East Lancashire Clearing Hospital. — Quartermaster and Honorary Lieutenant Arthur H. Hartshorn, from the 3rd East Lancashire Field Ambulance, to be Quartermaster with the honorary rank of Lieutenant, dated September 30, 1914.

Sanitary Services.—Major Robert Burnet, M.B., to be Lieutenant-Colonel, dated August 10, 1914; Cuthbert B. Moss-Blundell, M.D., to be Captain, dated August 15, 1914; Rupert Briercliffe, M.B., to be Captain, and is appointed Sanitary Officer, East Lancashire Territorial Division, dated September 1, 1914.

Sanitary Officers.—Captain John M. Hamill, from attached to units other than medical units, to be Sanitary Officer to the 2nd London Territorial Division, dated September 23, 1914; Captain Harry Hunter resigns his commission, dated October 21, 1914.

ATTACHED TO UNITS OTHER THAN MEDICAL UNITS.

Surgeon-Lieutenant-Colonel Charles Downing is seconded, dated September 30, 1914.

Surgeon-Captain Henry James Taylor to be Major, dated September 30, 1914.

Captain Edgar Vaughan Phillips, from the 5th Northern General Hospital, to be Captain, dated August 6, 1914.

Surgeon-Captain Jonas W. Anderson, M.B., from the 4th Battalion, The Royal Welsh Fusiliers, to be Captain, dated September 30, 1914.

Captain Winstan St. A. St. John resigns his commission on account of ill-health, dated September 30, 1914.

Lieutenant Eric D. Gairdner, M.B., to be Captain, dated August 10, 1914.

Lieutenant Hugh L. Munro, M.D., to be Captain, dated August 28, 1914.

Lieutenant Ernest W. Reed, M.B., to be Captain, dated September 1, 1914.

Lieutenant Alexander G. Lovett-Campbell, M.B., to be Captain, dated September 3, 1914.

Lieutenant Charles Douglas, M.B., to be Captain, dated September 8, 1914.

George Bainton Forge to be Lieutenant, dated August 8, 1914.

James York Moore to be Lieutenant, dated September 30, 1914.

Frank Rhodes Armitage, M. B., to be Lieutenant, dated August 5, 1914.

Robert Andrew Kerr, M.B., to be Lieutenant, dated October 1, 1914.

The undermentioned to be Lieutenants, dated September 5, 1914: Eric Lewis Giblin, M.B.; Alfred Evan Lewis Devonald; William Ernest Falconar; Arvor Jones; Grahame Patton; Martin Blenheim Howard Stratford, F.R.C.S.Edin.; Charles Wynn Wirgman, M.D., F.R.C.S.

Major Robert W. Forrest, M.B., is seconded, dated August 30, 1914.

Captain William H. Galloway to be Major, dated July 26, 1914.

Captain William G. Sutcliffe is restored to the establishment, dated September 23, 1914.

Lieutenant John M. Hamill to be Captain, dated September 23, 1914.

The notice which appeared in the *London Gazette* of July 21, 1914, announcing the resignation of Captain George B. Gill, M.B., is cancelled.

Arthur Cecil Hincks to be Lieutenant, dated August 31, 1914.

Captain John Best McBride to be Major, dated September 26, 1914.

Lieutenant Christopher Francis Murphy to be Captain, dated September 1, 1914.

Edward Bromet to be Lieutenant, dated September 23, 1914.

Surgeon-Major Henry Waite, from the Northern Command Signal Companies, Royal Engineers (Army Troops), to be Major, dated September 5, 1914.

The appointment to the Territorial Force of Major George M. Dobson, M.B., Reserve of Officers, which was announced in the *London Gazette*, of August 18, 1914, is cancelled.

Captain James C. Herbertson is seconded, dated September 9, 1914.

Captain William G. Sutcliffe is seconded, dated September 9, 1914.

Lieutenant James McGlashan, M.D., to be Captain, dated September 9, 1914.

Lieutenant William Robort Murison to be Captain, dated September 9, 1914.

Lieutenant Frederick W. Price, M.B., resigns his commission, dated September 9, 1914.

Captain Charles J. Martin, M.B., to be Major, dated September 30, 1914.

Surgeon-Captain John Livingstone, M.B., from the Westmorland and Cumberland Yeomanry, to be Captain, dated September 16, 1914.

Francis Henry Sprague to be Lieutenant, dated September 30, 1914.

The announcement which appeared in the *London Gazette* of the 11th instant appointing Arthur Henry Smith (late Captain and Honorary Major, 8th (Ardwick) Battalion, The Manchester Regiment) to be Captain, is cancelled.

Cecil Arthur Ensor to be Captain, dated October 14, 1914.

Herbert Connop to be Lieutenant, dated October 14, 1914.

Captain Francis W. Goodbody, M.D., from the 3rd London General Hospital, to be Captain, dated September 14, 1914.

Arthur Henry Smith (late Captain, 8th (Ardwick) Battalion, The Manchester Regiment) to be Captain, dated September 12, 1914.

Hyman Lightstone to be Lieutenant, dated September 12, 1914.

Lieutenant Norman M. Fergusson, M.B., to be Captain, dated August 11, 1914.

Lieutenant Robert W. Simpson, M.B., to be Captain, dated September 28, 1914.

John Forbes Ward, M.B., to be Lieutenant, dated August 7, 1914.

John James Scanlan (late Surgeon-Captain, 35th Imperial Yeomanry), to be Lieutenant, dated September 19, 1914.
Thomas Renton Elliott, M.D., to be Lieutenant, dated September 28, 1914.
The date of appointment of Lieutenant Martin B. H. Stratford, F.R.C.S., is August 7, 1914, and not as stated in the *London Gazette* of September 4, 1914.
Major William Kirman Pauli, from the Territorial Force Reserve, to be Major, dated October 15, 1914.
Major Herman Stedman, F.R.C.S.Edin., resigns his commission, and is granted permission to retain his rank and wear the prescribed uniform, dated October 15, 1914.
Captain Charles Arthur Morris, C.V.O., M.B., F.R.C.S., to be Major, dated September 11, 1914.
Supernumerary Captain Matthew B. Ray, M.D., is absorbed into the establishment, dated October 15, 1914.
Lieutenant Alan C. Ransford to be Captain, dated October 15, 1914.
Thomas Vicars Oldham, M.B., to be Lieutenant, dated October 15, 1914.
James Gerald Fayrer Hosken to be Lieutenant, dated October 15, 1914.
Edward Lister Martin, M.D., to be Lieutenant, dated October 15, 1914.
The date of appointment of Lieutenant Leonard West, M.B., is August 5, 1914, and not as stated in the *London Gazette* of August 25, 1914.
Captain F. G. Proudfoot to be Major, dated August 12, 1914.
Surgeon-Captain Henry Skelding, M.B., to be Surgeon-Major, dated August 10, 1914.
Surgeon-Captain J. E. Bates, M.B., to be Surgeon-Major, dated September 19, 1914.
Surgeon-Lieutenant William Marley-Cass, from the 5th (Cumberland) Battalion, The Border Regiment, to be Lieutenant, dated August 23, 1914.
Lewis Campbell Bruce, M.D., to be Lieutenant, dated September 19, 1914.
Lieutenant Joseph M. A. Costello, M.B., to be Captain, dated August 5, 1914.
Surgeon-Lieutenant Harry G. F. Dawson, from the Welsh Divisional Engineers, to be Captain, dated August 5, 1914.
Lieutenant Vincent Howard to be Captain, dated September 16, 1914.
Lieutenant Arthur C. Bird to be Captain, dated September 16, 1914.
Surgeon-Major Alexander Cosgrave resigns his commission on account of ill-health, dated September 16, 1914.
The transfer to the Territorial Force Reserve of Captain Leonard B. Cane, M.D., which was announced in the *London Gazette* of August 21, 1914, is cancelled.
William Albert Robertson to be Lieutenant, dated September 16, 1914.
Lieutenant Dudley R. Harris to be Captain, dated August 4, 1914.
William Leslie Burgess to be Lieutenant, dated October 3, 1914.
Captain John E. Molson, M.B., to be Major, dated October 10, 1914.
Cresswell Burrows, M.D., to be Lieutenant, dated September 1, 1914.
Humphry John Wheeler, M.D. (late Surgeon-Captain, 1st Buckinghamshire Rifle Volunteer Corps), to be Lieutenant, dated September 8, 1914.
Lieutenants James A. Stephen, M.B., Alexander C. Mallace, M.B., and George Henderson, from attached to units other than medical units, to be Lieutenants, dated September 7, 1914.
Francis Ryalls Eddison to be Lieutenant, dated September 18, 1914.
Robert Evelyn Tissington Tatlow, M.D., to be Lieutenant, dated October 10, 1914.
Lieutenant Lee D. B. Cogan to be Captain, dated September 25, 1914.
Lieutenant Frederick A. W. Drinkwater to be Captain, dated August 5, 1914.
Frank Winter Lawson to be Lieutenant, dated October 7, 1914.
Charles Butler to be Lieutenant, dated October 7, 1914.

Supernumerary for Service with the Officers Training Corps.

Andrew Daniel Clinch, M.D., to be Lieutenant, for service with the Dublin University Contingent, Senior Division, Officers Training Corps, dated September 10, 1914.
Frederick John Cleminson to be Lieutenant, for service with the University of London Contingent, Senior Division, Officers Training Corps, dated September 7, 1914.

ROYAL ARMY MEDICAL COLLEGE.

LIST OF BOOKS ADDED TO THE LIBRARY DURING THE MONTHS OF JULY, AUGUST, AND SEPTEMBER, 1914.

Title of Work and Author	Edition	Date	How obtained
The Principal Household Insects of the United States. By L. O. Howard and C. Marlatt		1902	Library Grant.
Official Year-Book of the Scientific and Learned Societies of Great Britain and Ireland		1913	,, ,,
With the British Red Cross in Turkey. The Experiences of two Volunteers, 1912-1913. By A. Duncan-Johnstone		1913	,, ,,
Cambridge Naval and Military Series. Ocean Trade and Shipping. By Douglas Owen		1914	, ,,
Cambridge Naval and Military Series. Naval and Military Essays, being papers read in the Naval and Military Section of the International Congress of Historical Studies		1914	, ,,
The Journal of a Cavalry Officer in the Corunna Campaign, 1808-1809. The Journal of Capt. Gordon of the 15th Hussars. Edited by Col. H. C. Willy, C.B.		1913	,, ,,
Lord Lister, his Life and Work. By G. T. Wrench, M.D.		1914	,, ,,
Lang's German-English Dictionary of Terms used in Medicine and the Allied Sciences. Edited and Revised by M. K. Myers, M.D.	2nd	1913	,, ,,
Hygiene. By Notter and Firth	8th	1912	,, ,,
Clinical Methods. By Hutchison and Rainy ..	5th	1912	,, ,,
The Bacteriological Examination of Food and Water. By W. G. Savage, M.D.		1914	,, ,,
Isolation Hospitals. By H. F. Parsons		1914	,, ,,
Nucleic Acids, their Chemical Properties and Physiological Conduct. By Walter Jones, Ph.D.		1914	,, ,,
Intermetallic Compounds. By C. H. Desch, D.Sc.		1914	,, ,,
The Viscosity of Liquids. By Dunstan and Thole		1914	,, ,,
The Practice of Medicine. By F. Taylor, M.D. ..	10th	1914	,, ,,
X-Rays: An Introduction to the Study of Röntgen Rays. By G. W. C. Kaye, B.A., D.Sc.		1914	,, ,,
Practical Pharmacy. By E. W. Lucas	2nd	1908	,, ,,
First Lines in Dispensing. By E. W. Lucas ..		1908	,, ,,
The Book of Receipts (Beasley). By E. W. Lucas	11th	1907	,, ,,
Physical Diagnosis. By R. C. Cabot, M.D. ..	5th	1913	,, ,,
An Introduction to the Study of Organic Chemistry. By H. T. Clarke, D.Sc.		1914	,, ,,
A Text-book of Mining Geology. By James Park..		1911	,, ,,
Manual of Operative Surgery. By H. J. Waring ..	4th	1912	,, ,,
Wheeler's Handbook of Medicine. By W. R. Jack, M.D.	4th	1914	,, ,,
North Manchurian Plague Prevention Service Reports (1911-1913). Edited by Wu Lieu Teh (G. L. Tuck), M.A., M.D.		1914	,, ,,
A Manual of Bacteriology. By R. T. Hewlett, M.D.	5th	1914	,, ,,
Surgical Applied Anatomy. By Treves and Keith	6th	1913	,, ,,
The Principles of Pathologic Histology. By F. B. Mallory, M.D.		1914	,, ,,
The Student's Handbook of Surgical Operations. By Treves and Hutchinson	3rd	1911	,, ,,
The Antiquity of Man in Europe. By James Geikie, LL.D.		1914	,, ,,

List of Books added to the Library—*Continued.*

Title of Work and Author	Edition	Date	How obtained
Surgical Diseases of the Liver, Gall Bladder, and Biliary System. By H. J. Waring		1897	Library Grant.
English-German and German-English Dictionary. By J. E. Wessely. Revised by C. Stoffel and G. Payn		No date	,, ,,
Manual of Military Hygiene for the Military Services of the United States. By Valery Havard, M.D.	2nd	1914	,, ,,
Text Book of Local Anæsthesia. By Prof. Dr. G. Hirschel. Translated by E. H. Krohn		1914	Editor, Journal.
The Ileo-Cæcal Valve. By A. H. Rutherford, M.D.		1914	,, ,,
St. Thomas's Hospital Reports. New Series. Vol. xli		1914	,, ,,
Diseases of the Rectum and Anus. By P. Lockhart Mummery		1914	,, ,,
British Red Cross Society. Hygiene and Sanitation Manual, No. 4. By Lieut.-Col. S. Guise Moores, R.A.M.C.		1914	,, ,,
Sclero-Corneal Trephining in the Operative Treatment of Glaucoma. By Lieut.-Col. R. H. Elliot, M.D., I.M.S.	2nd	1914	,, ,,
How to Keep Fit. A Series of Special Lectures to Young Men delivered at the Central Y.M.C.A., London		1914	,, ,,
Defensive Ferments of the Animal Organism. By Emil Abderhalden. Translated by Gavronsky and Lanchester	3rd	1914	,, ,,
Saint Bartholomew's Hospital Reports. Vol. 1, Part I		1914	,, ,,
The Year Book of the All-India Sub-Assistant Surgeons Association		1914	,, ,,
Collected Papers from the Research Laboratory, Parke, Davis & Co. Reprints, vol. ii		1914	,, ,,
Metropolitan Borough of Poplar. Annual Report for the year 1913. By F. W. Alexander		1914	Commandant's Office.
Examination of Officers for Promotion held in April, 1914		1914	,, ,,
A Report on the Enquiry into the Prevalence of Malaria in Meerut, 1911		1913	Special Malaria Officer, United Provinces.
Progress Report on School Quininization in the United Provinces in 1913. By Major J. D. Graham, I.M.S.			,, ,,
Narrative of the most Remarkable Events which occurred in and near Leipzig, immediately before, during, and subsequent to the Sanguinary Series of Engagements between the Allied Armies and the French, from October 14 to 19, 1813. Illustrated with Military Maps. Compiled and Translated from the German by Frederic Shoberl	6th	1814	Presented by Major M. H. G. Fell, R.A.M.C.
Notes on Matters affecting the Health, Efficiency, and Hospital Administration of the British Army, founded chiefly on the Experience of the late War. By Florence Nightingale		1858	Presented by Mr. Bonham Carter, through Mrs. Nash, Cannon Lodge, Hampstead.

LIST OF BOOKS ADDED TO THE LIBRARY—*Continued.*

Title of Work and Author	Edition	Date	How obtained
Subsidiary Notes as to the Introduction of Female Nursing into Military Hospitals in Peace and War. By Florence Nightingale		1858	Presented by Mr. Bonham Carter, through Mrs. Nash, Cannon Lodge, Hampstead.
Wounds in War. By Colonel W. F. Stevenson, C.B., K.H.S., R.A.M.C. (Ret.)	3rd	1910	Presented by Longmans, Green and Co.
Metropolitan Water Board. Eighth Annual Report		1914	Presented by Dr. A. C. Houston.
,, ,, ,, Tenth Report on Research Work. By Dr. A. C. Houston		1914	,, ,,

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RESEARCH DEFENCE SOCIETY.

President, LORD LAMINGTON, G.C.M.G., G.C.I.E.

WE have been requested to publish the following leaflet:—

PROTECTION AGAINST TYPHOID FEVER.

We all know that there are certain fevers which we are not likely to have twice. The first attack protects us against a second attack. For instance, if we have once had scarlet fever, it will be many years before we can have it again; we may be exposed to it, but it will not be able to do us any harm. Some change was worked in us by the fever which keeps us proof against the fever. To this protection we give the name of *immunity*. It is not every kind of fever which does this. Influenza does not do it; a man can have influenza again and again. But a man is not likely to have scarlet fever twice, nor typhoid fever (also called enteric fever) twice.

The object of the preventive treatment against typhoid fever is, that you shall not have typhoid fever once.

Why is it that one attack of typhoid fever protects us against a second attack? It is because the germs of typhoid fever produce a chemical substance which we call *toxin*, and this toxin causes the blood to produce certain substances which fight the toxin. We give the name of *antitoxin* to these natural remedies which the blood makes in itself. The antitoxin produced by the blood opposes itself to the toxin produced by the germs. And, long after we have got well, this antitoxin still remains in our blood, guarding us against the risk of reinfection. Even if the germs of typhoid fever get into us, they will not injure us; for our blood is immune against them.

For the protective treatment, no living germs are used. Only the toxin is used. The germs are destroyed by heating, till nothing is left but the toxin which they produced. Thus, the treatment cannot give you typhoid fever: only living germs could do that. But the toxin can, and does, enable your blood to form antitoxin; and this antitoxin can, and does, protect you against typhoid fever.

It is very important, that the treatment should be given, not in one large dose, but in two, or even three, smaller doses, with an interval of some days between each dose, so that your general health may be disturbed as little as possible.

This protective treatment was discovered by Sir Almroth Wright, and was first used in 1896. At the time of the South African War, 1899-1902, it caused serious disturbance of the general health in some cases for several days. Still, the results proved that typhoid fever, in the South African War, was twice as common in the non-protected as in the protected.

It is fifteen years since the outbreak of the South African War. Let us take some more recent results; the improvements made in the protective treatment have not been in vain.

(1) Mr. Taft, on May 4, 1911, at the time when he was President of the United States, said: "We have a division of 18,000 men in Texas and California. They have been there for two months, living under canvas, and in a country soaked with rain and deep with profanity-provoking mud. But so effective have been the regulative and preventive methods adopted to reduce sickness that the percentage of sick men is less than it was in the posts from which these men were mobilized. I need not recall the dreadful record of sickness from typhoid fever in the camps at Chickamauga and other camps established during the Spanish-American War. The percentage of typhoid cases was so high that it is hard to believe. Of 120.000 men there were 20.000 cases, with a case-mortality of 7 per cent. Of the volunteer regiments mobilized during the Spanish-American War, 90 per cent. became infected with typhoid fever within eight weeks from the date of mobilization. To-day, two months after mobilization, with the modern health regulations, and by the use of vaccination against typhoid, not one case of typhoid fever has appeared in the entire force, except that of one teamster who was not vaccinated. It is hard to credit the accuracy of such a record, but, as I have it directly from the War Office, I can assert it as one more instance of the marvellous efficacy of recent medical discoveries and practice." In the autumn of 1911, the protective treatment was made compulsory throughout the United States Army for all officers and men under 45; except, of course, those who had already suffered from typhoid fever.

(2) Sir William Leishman, in a letter published during the present war, August 22, 1914, says: "The benefits of inoculation are so well recognized in the regular forces that we find little difficulty, in foreign stations, in securing volunteers for inoculation: for instance, about 93 per cent. of the British garrison of India have been protected by inoculation, and typhoid fever, which used to cost us from 300 to 600 deaths annually, was last year responsible for less than 20 deaths. Inoculation was made compulsory in the American Army in 1911, and has practically abolished the disease; in 1913 there were only three cases and no deaths in the entire army of over 90,000 men."

(3) In Avignon, in the South of France, during the summer of 1912, typhoid fever broke out in the barracks. Of 2,053 men, 1,366 were protected and 687 were not. The non-protected had 155 cases of typhoid fever, of whom 21 died; the protected had not one case. In the winter of 1913, the French Senate resolved that the protective treatment should be made compulsory throughout the French Army; and, in special circumstances, among the reservists.

(4) In Canada, among the "camps" of the Canadian Pacific Railway, the protective treatment has given excellent results. In 1911, among 5,500 men protected, there were only two cases of typhoid fever; while, among 4,500 non-protected men, there were 220 cases. In 1913, among 8,400 men protected, there was only one case; while, among 2,000 non-protected men, there were 76 cases.

These four instances are enough to show the great value of this treatment. Remember to avoid all excitement or exertion for twenty-four hours after you have been treated. Any serious discomfort from the treatment, nowadays, is very rare; still, some people are more sensitive to it than others. But it is better to run the risk of discomfort than to run the risk of typhoid fever. Besides, typhoid fever is dangerous not only to the patient, but to other men who may get the infection from him.

If desired, you can be treated with approved vaccine, free of charge, at the office of the Research Defence Society. Address: Hon. Secretary, 21, Ladbroke Square, W. Telephone 975 Park.

WAR AND THE PROFESSIONAL CLASSES.

FORMATION OF A RELIEF COUNCIL.

DIRECTLY the war broke out the distress expected to arise therefrom among the industrial population was at once anticipated and taken in hand to be dealt with adequately by the National Relief Fund. The response to the Prince of Wales's appeal was immediate and generous, with the result that there is little fear of irremediable upheaval of conditions among the industrial classes.

This fund, however, as everyone knows, makes grants only to the Local Distress Committees and the Soldiers' and Sailors' Families Association. It does not therefore touch in any way the great distress already prevalent among the professional classes, for men and women of this class cannot appeal for help to the Local Distress Committees, who possess no adequate machinery for dealing with such cases.

Yet this class is the one hit most promptly and severely by the dislocation of business, and by the sudden, unexpected cessation of the demand for luxuries. In fact, not only are all the professions which depend upon the conditions of peace and the fluency of the market practically at a standstill, but also the creative and artistic professions, such as literature, journalism, the stage, art, etc. All these rely upon the conditions of peace or the demand for luxuries, and that demand is gone. However long the war may last, it is certain that the dislocation in the professions will continue for some years after peace has been made.

Many small but hitherto prosperous homes will be broken up through the mainstays being thrown out of work, or through the men, moved by the needs of their country, having enlisted as ordinary privates, receiving of course as such the ordinary pay of a private; this is naturally insufficient to keep the home together on anything like the standard of living that has hitherto been attained. In many cases also financial difficulties may arise because securities cannot be realized, or loans negotiated.

It is obvious, then, since there is no control organisation or general fund to meet the distress already so prevalent, that the need for such a fund is very great.

During the last few weeks, therefore, there has been in process of formation an organization to be called the Professional Classes' War Relief Council.

This council is composed of the nominees of the majority of the principal professional institutions, such as the architects, surveyors, engineers, musicians, authors, etc., as well as representatives of the chief societies engaged in relief work (in order to promote valuable co-operation), with the result that it is a very representative and powerful body of business men and women.

The council does not propose to offer any form of charity in relief, as this would naturally be both impossible and undesirable, but it does propose to give certain centralized forms of assistance, which will, it is hoped, tide over the critical period of the war, enabling people so severely hit to resume their normal status when the war is over.

The majority of the professional societies have their own benevolent funds; these are and must remain quite independent, but it will ensure the most adequate return for outlay being obtained if certain forms of assistance are centralized, and made available for their use.

The chief forms of assistance arranged are in matters of education, training, emigration, maternity aid, and temporary employment, all of which are worked under separate representative sub-committees of men and women whose positions and capabilities fit them especially for dealing with their special departments.

For example, the education committee is composed of the presidents of the principal scholastic associations, and has as its objective the arrangement of co-operation with the proprietors and governing bodies of schools by which children whose parents, through financial stress, are unable to pay the usual school fees, will be maintained at school at reduced fees assisted by a grant from the funds of the council—thereby ensuring both the continuity of the schools, many of which would otherwise have to close down owing to the withdrawal of pupils, and also the uninterrupted education of the children, which is so vitally important to the national life.

The training and emigration committee proposes chiefly to arrange free training for those professions for which it has been ascertained that openings exist either at

home or in the overseas dominions. This will apply mainly to men and women in already overstocked professions.

Numbers of domestic and emigration colleges have offered free or greatly reduced trainings to the council, and these scholarships are immediately available.

The maternity assistance committee proposes to open a maternity nursing home for wives of professional men, staffed by voluntary doctors and midwives. A suitable building has already been generously lent for the purpose. It is also proposed to give free maternity assistance in their own homes, so long as those homes can be kept together. This committee and staff comprise some of the most eminent men and women in the medical world.

The temporary employment committee has been organized to develop opportunities for temporary employment in works of public and national utility, both for men and women.

It has also been found necessary to meet the demand for immediate relief while people are waiting to be placed in permanent work. The Women's Emergency Corps and the National Union of Women's Suffrage Societies have opened certain temporary workrooms for needlework, toy making, etc., for professional women, which they have arranged to make available to nominees of the council.

It will be seen how far-reaching and important the work of this council is, for it affects not only the conditions immediately confronting us while the war lasts. It may develop on such lines as would be of permanent value in forming a centre for all information relative to the conditions and opportunities of employment in the various professions.

It is necessary to form a central fund to carry on this great work, the fund being used to organize and maintain the various forms of assistance proposed; to help those members of professions which are not organized and have therefore no benevolent funds to provide assistance for the families of professional men who have given up all to enlist for the service of their country.

All those who have this very real need at heart are earnestly invited to give practical support by sending donations to the Treasurer, Professional Classes' War Relief Council, 13 and 14, Prince's Gate, S.W. Cheques to be crossed Messrs. Coutts and Co.

MARRIAGE.

CUMMING—BIDDULPH.—On the 10th ult., at Holy Trinity Church, Sliema, by the Rev. Canon H. Shaw, Major C. C. Cumming, R.A.M.C., to Muriel, youngest daughter of Deputy Surgeon-General Biddulph, R.N.

DEATHS.

ERSKINE.—Major William Douglas Erskine, M.B., Reserve of Officers, Royal Army Medical Corps, died at Uddingston, County of Lanark, on October 24, 1914, aged 50.

BRADSHAW.—Killed in action in France on October 13, Arthur Edwin Bradshaw, aged 32, M.A.(Oxon.), Captain, 14th Jat Lancers, Indian Army, attached 15th Hussars, British Expeditionary Force, youngest son of Surgeon Major-General Sir A. Frederick Bradshaw, K.C.B., K.H.P.

EXCHANGES, &c.

The charge for inserting Notices respecting Exchanges in the Royal Army Medical Corps is 5/- for not more than five lines, which should be forwarded by Cheque or P.O.O., with the notice, to Messrs. G. STREET and CO., Ltd., 8, Serle Street, London, W.C., not later than the 22nd of the month.

A free issue of twenty-five reprints will be made to contributors of Original Communications, and of twenty-five excerpts of Lectures, Travels, and Proceedings of the United Services Medical Society.

Any demand for excerpts, additional to the above, or for reprints, must be forwarded at the time of submission of the article for publication, and will be charged for at the following rates, and additional copies at proportionate rates :—

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12	4	0 2 6	0 1 0				
	8	0 4 6	0 2 0	3 6	0 11	3 2	0 7
	16	0 7 6	0 3 6				
25	4	0 3 0	0 1 3				
	8	0 5 6	0 2 6	4 0	1 3	3 6	0 9
	16	0 9 6	0 4 6				
50	4	0 4 0	0 1 8				
	8	0 6 9	0 3 2	5 0	1 9	4 0	1 0
	16	0 12 0	0 5 3				
100	4	0 5 6	0 2 9				
	8	0 9 0	0 4 4	6 6	3 3	5 6	2 0
	16	0 16 9	0 6 9				
200	4	0 8 6	0 4 0				
	8	0 13 6	0 6 0	9 0	6 3	7 6	4 0
	16	1 3 6	0 8 9				

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All Applications for Advertisements to be made to—

G. STREET & CO., Ltd., 8, Serle Street, London, W.C.

The back outside cover is not available for advertisements.

Notices.

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, etc. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts, and commands at home and abroad.

Matter intended for the Corps News should reach the Editor not later than the 15th of each month for the following month's issue. Notices of Births, Marriages, and Deaths are inserted free of charge to subscribers and members of the Corps. All these communications should be written upon one side of the paper only; they should by preference be type-written, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed The Editor, "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS," War Office, Whitehall, London, S.W.

Communications have been received from Major C. E. Pollock, Lieutenant-Colonel W. P. O'Brien, Ferguson Lemon, M.B., B.S., Colonel R. H. Firth, Lieutenant T. H. Just.

The following publications have been received:—

British: Tropical Diseases Bulletin, The Hospital, The Journal of Tropical Medicine and Hygiene, The Lancet, Journal of the United Service Institution of India, Journal of the Supply and Transport Corps (Indian Army), Metropolitan Water Board, The Practitioner, Medical Press and Circular, The Royal Engineers' Journal, The Red Cross, Guy's Hospital Gazette, The Indian Medical Gazette, Medical Journal of Australia, St. Bartholomew's Hospital Journal, Red Cross and Ambulance News, The Medical Review, Public Health, The Medical Journal of South Africa, The Journal of State Medicine, The Indian Medical Journal, Yellow Fever Commission (West Africa), Tropical Veterinary Bulletin, The Quarterly Journal of Medicine, The Animals' Friend, The British Journal of Tuberculosis, Report of the Local Government Board, Bulletin of Entomological Research, Memoirs of the Department of Agriculture in India, The Indian Journal of Medical Research, The Australian Military Journal, Transactions of the Society of Tropical Medicine and Hygiene.

Foreign: Archives de Médecine et Pharmacie Navales, War Department Office of the Surgeon-General, United States, The Military Surgeon, Revista de Sanidád Militar, Bulletin of the Johns Hopkins Hospital, The Journal of Infectious Diseases, Bulletin of the Johns Hopkins Journal, Giornale di Medicina Militare.

MANAGER'S NOTICES.

The Journal of the Royal Army Medical Corps is published monthly, six months constituting one volume, a volume commencing on 1st July and 1st January of each year.

The Annual Subscription is £1 (which includes postage), and should commence either on 1st July or 1st January; but if a subscriber wishes to commence at any other month he may do so by paying for the odd months between 1st July and 1st January at the rate of 1s. 8d. (one shilling and eightpence) per copy. (All subscriptions are payable in advance.)

Single copies can be obtained at the rate of 2s. per copy.

The Corps News is also issued separately from the Journal, and can be subscribed for at the rate of 2s. (two shillings) per annum, including postage. Subscriptions should commence from 1st July each year; but if intending subscribers wish to commence from any other month, they may do so by paying for the odd months at the rate of 2d. per copy. (All subscriptions are payable in advance.)

Officers of the Royal Army Medical Corps possessing Diplomas in Public Health, etc., are kindly requested to register their special qualifications at the War Office. Letters of complaint are frequently received from officers stating that their special qualifications have not been shown in the Distribution List which is published as a supplement to the Journal in April and October of each year. As, however, the particulars of this list are supplied from official sources, officers are reminded that unless the possession of Diplomas, etc., has been registered at the War Office, no entry of such qualifications can be recorded in the Distribution List.

Letters notifying change of address should be sent to the Hon. Manager, "Journal of the Royal Army Medical Corps," War Office, Whitehall, London, S.W., and must reach there not later than the 20th of each month for the alteration to be made for the following month's issue.

It is requested that all Cheques or Postal Orders for Subscriptions to the Journal, Corps News, Reprints, &c., be crossed "Holt & Co.," and made payable to the "Hon. Manager, Journal R.A.M.C.," and not to any individual personally.

All communications for the Hon. Manager regarding subscriptions, etc., should be addressed to

The Hon. Manager,
"Journal of the Royal Army Medical Corps,"
War Office, Whitehall, S.W.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

NOVEMBER, 1914.[1]

ARMY MEDICAL SERVICE.

The undermentioned to be Lieutenant-Colonels:—

Dated November 27, 1914.—Major Hubert A. Bray, and to remain seconded; Major Thomas McDermott, M.B.

The name of temporary Major John Hall-Edwards is as now described, and not as stated in the *Gazette* of December 7, 1914.

The undermentioned to be temporary Lieutenants:—

Dated September 26, 1914.—Alexander Bremner, M.B.

Dated December 1, 1914.—John Hanson, M.B.; James Jameson Dwyer; William John Fitzgerald Mayne, M.B.; Mackenzie Douglay, M.D.

Sir Alexander MacCormick, M.D., is granted temporarily the honorary rank of Lieutenant-Colonel whilst serving with the Australian Medical Unit, dated December 19, 1914.

The date of grant of honorary rank of Major to Quartermaster and Honorary Captain John Green is November 18, 1914, and not as stated in the *Gazette* of December 7, 1914.

Major Frederic W. Lambelle, M.B., is placed temporarily on the Half-pay List on account of ill-health, dated December 19, 1914.

The undermentioned temporary Captains to be temporary Majors:—

Dated December 17, 1914.—Alfred E. Johnson, M.B., F.R.C.S.; Robert Davies-Colley, F.R.C.S.

The undermentioned to be temporary Lieutenants:—

Dated November 1, 1914.—Francis Hubert Storey, M.B.

Dated December 1, 1914.—Herbert Hoyle Whaite, M.B.; Joseph Gordon Macqueen, M.B.; John Matthewson Clements, M.D.; Thomas Izod Bennett, M.B.; Hugh Bevan Waller; Andrew Taylor Ross, M.D., F.R.C.S.Edin.; John Francis Gibbons.

Dated December 2, 1914.—Robert Dow Forbes, F.R.C.S.; Raymond John Jones, M.B.; Reginald Hutchinson Lucas; Alexander William Rattrie, M.B.; Robert Francis Ferris, M.B.; Eslyn Marjoribanks-Marcar; Charles Stanley Cato; Robert Bradley Roe; Frank Garratt; David Dale Logan, M.D.

Dated August 11, 1914.—Henry Moore.

Dated December 6, 1914.—Henry Heathcote White, M.D.

Dated December 7, 1914.—James Morgan Barkley, M.B.; Lewis Augustus Walker, M.D.; Ernest Philip Chennells, M.B.; Reginald Sherman, M.B.; Charles Colgate Holman, M.B., F.R.C.S.; Frederick Paine, M.D.; Vynne Borland, M.B.; Archibald Louis George; John McAdam Hill, M.B.; John Cunningham McConaghey, M.D.; Joseph Sandys English, M.B.; James Reston Gardiner Garbutt, M.B.; Norman Booth, M.B.; Frank Anderson Murray, M.D.; Sidney James Ormond, M.D.; Roderick Alan Campbell, M.D.; John Joseph Johnson, M.D.; John Nairn Dobbie, M.B.; Sydney Guy Billington, M.B., F.R.C.S.Edin.; Montgomery Du Bois Ferguson, M.D.; William Forbes Dunlop, M.B.; Frederick Robert Dougan, M.B.; Ignatius Alphonsus Dowling; Samuel Campbell, M.B.; John Corfield Pitter Bayley.

Dated December 8, 1914.—Edwin Charles Allan Smith; John William Cormack Gunn, M.B.; George William Armstrong; Henry Thwaites; Leonard Douglas Saunders; Stuart Murray, M.B.; James Craig, M.B.; Ernest Dixon Wortley; Horace Ernest Humphrey Tracy; Thomas Duncan; John Lumb, M.B.

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[1] The November number includes Corps News received during December.

Dated December 10, 1914.—James Allen Montgomery, M.D.; Robert Marshall, M.B.; James Reginald Kemp; Guy Matthews, M.B.; James Douglas Carnon Swan, M B.; Vincent Joseph Lawless; William Lang Hodge; Arthur Victor Junius Harrison, M.B.; Robert Masson Greig, M.B.; Douglas Henry David Wooderson, M.B.; Clare Oswald Stallybrass, M.D.; Patrick Joseph Standish O'Grady, M.B.; Richard Caldecott Monnington, M.D.; Thomas Brownlie McKendrick; John Stephenson, M.B.; Derwent Christopher Turnbull, M.B.; Robert Masson Boyd, M.B.; Sydney James Simpson, M.B., F.R.C.S.Edin.; Edwin Kidd, M.B.

Dated December 11, 1914.—William Morris; Cecil Anderson Boyd, M.D.

Dated December 12, 1914.—Carl Rudolf Baltzar Von Braun; Arnold Charles Summerson Courts, M.D.

Lieutenant William N. Alexander relinquishes his temporary commission, dated December 10, 1914.

Temporary Lieutenant Frederick G. Sharpe resigns his commission, dated December 11, 1914.

Quartermaster and Honorary Captain Heney Woolley to be Honorary Major, dated December 13, 1914.

REVISED AND CORRECTED LIST OF NAMES APPENDED TO SIR JOHN FRENCH'S DESPATCH, DATED OCTOBER 8, 1914 (INCLUDING THOSE PUBLISHED FOR THE FIRST TIME IN THE "LONDON GAZETTE," DATED DECEMBER 4, 1914).

Amy, Captain A. C., M.D.
Babington, Major M. H.
Barefoot, Lieutenant-Colonel G. H.
Beveridge, Lieutenant-Colonel W. W. O., D.S.O., M.B.
Bourke, Major E. A.
Burke, Major B. B.
Clark, Lieutenant-Colonel S. F., M.B.
Cummins, Major S. L., M.D.
Fell, Major M. H. G.
Forrest, Major J. V., M.B.
Gallie, Major J. S.
Low, Captain N.
Lynden-Bell, Colonel E. H. L., M.B.
McNaught, Major J. G., M.D.
Moore, Major G. A., M.D.
Myles, Major C. D., M.B.
O'Donnell, Colonel T. J., D.S.O.
Otway, Captain A. L., M.B.
Russell, Lieutenant-Colonel J. J., M.B.
Smith, Brevet-Colonel F., D.S.O.
Steel, Major E. B., M.B.
Symons, Major F. A., M.B.
Waring, Major A. H.
Webb, Major A. L. A.
Westcott, Colonel S., C.M.G.
Woodhouse, Surgeon-General T. P.
Chopping, Major A.
Cree, Lieutenant-Colonel G.
Dalton, Lieutenant-Colonel C.
Hickson, Colonel S., M.B.
Porter, Colonel R., M.B.
Ryan, Major E.
Sawyer, Colonel R. H. S., M.B., F.R.C.S.I.
Smallman, Major A. B., M.D.
White, Lieutenant E., Royal Army Medical Corps (attached).
Huggan, Lieutenant J. L., M.B., Royal Army Medical Corps (attached).
Shields, Lieutenant H. J. S., M.B., Royal Army Medical Corps (attached).
Leckie, Captain M., Royal Army Medical Corps (attached).
Kempthorne, Captain G. A., Royal Army Medical Corps (attached).
Ranken, Captain H. S., M.B., Royal Army Medical Corps (attached).
Lewis, Captain S. E., M.B., Royal Army Medical Corps (attached).
Beddingfield, Lieutenant H., M.B.
Birrell, Major E. T. F., M.B.
Bourdillon, Lieutenant L. G.
Butler, Major S. G.
Caddell, Captain E. D., M.B.
Cowey, Major R. V.
Dolbey, Lieutenant R. V., F.R.C.S.
Ensor, Major H., M.B., D.S.O.
Fielding, Major T. E., M.B.
Foster, Major R. L. V., M.B.
Goodwin, Major, T. H. J. C., D.S.O.
Grech, Major J.
Hairsine, Lieutenant C. (Special Reserve).
Helm, Lieutenant C.
Hinge, Major H. A.
Hopkins, Lieut. H. L. (Civil Surgeon).
Howells, Lieutenant W. M., M.B.
Lathbury, Captain E. B.
Leckie, Captain M.
Lloyd, Major L. N., D.S.O.
McEntire, Captain J. T., M.B.
Mitchell, Lieutenant-Colonel L. A., M.B.
Morgan, Lieutenant-Colonel J. C.
Murphy, Capt. J. F., M.B. (Special Reserve).
Nimmo, Captain W. C. (attached 1st Battalion, Loyal North Lancs. Regt.).
O'Brien-Butler, Captain C. P. (attached 5th Lancers).
Osburn, Captain A. C.
Preston, Lieutenant R. A., M.B.
Profeit, Major C. W., M.B.
Sampson, Captain F. C., M.B.
Stewart, Captain H., M.B.
Ware, Captain G. W. W., M.B.
Wyler, Lieut. E. J., M.D. (Civil Surgeon).

His Majesty the King has been graciously pleased to approve of the appointment of the undermentioned officers to be Companions of the Distinguished Service Order, in recognition of their services with the Expeditionary Force, specified below:—

Lieutenant Henry Beddingfield, M.B., Royal Army Medical Corps.

For coolness and daring in repeatedly superintending removal of wounded from the firing line, under heavy fire.

Major Sidney George Butler, Royal Army Medical Corps.

At Missy, on September 15, for coolness and courage in continuing all day to collect wounded under shell fire.

Captain Malcolm Leckie, Royal Army Medical Corps (deceased).

For gallant conduct and exceptional devotion to duty in attending to the wounded at Frameries, where he was himself wounded.

Captain James Stuart Dunne, Royal Army Medical Corps.

During German attack on night of October 31, near Messines, he established a dressing station just behind the trenches, and was the means of saving many lives, he himself going several times into the trenches to attend to wounded men who could not be moved.

Captain Patrick Sampson, Royal Army Medical Corps.

Has shown frequent and conspicuous gallantry throughout the campaign, especially on October 21 and 22, attending wounded men under very heavy shell fire.

Captain Sidney John Steward, Royal Army Medical Corps (Special Reserve).

Went with party of stretcher bearers across ground swept by rifle and shell fire to Langemark village and removed eleven wounded men.

EXTRACT FROM THE "LONDON GAZETTE" OF DECEMBER 22, 1914.

The President of the French Republic has bestowed the Decoration of the Legion of Honour (Croix de Chevalier), on Captain J. J. O'Keeffe, M.B., Royal Army Medical Corps, with the approval of His Majesty the King, for his gallantry during the operations between August 21 and 30, 1914, with the Expeditionary Force.

NOTES FROM SIMLA.—Lieutenant-Colonel E. Eckersley, R.A.M.C., Assistant Director of Medical Services (British Service), temporary, writes as follows, dated Simla, November 19, 1914:—

"*Appointments.*—The undermentioned officers have been appointed to the command of the station hospitals shown against them:—

"Major J. C. Kennedy, Station Hospital, Naini Tal.

"Major E. E. Parkes, Station Hospital, Jubbulpore.

"Major J. C. Kennedy has been also appointed to hold medical charge of the Enteric Convalescent Depot, Naini Tal.

"*Casualties.*—The following officer has been killed in action:—

"Captain C. A. T. Conyngham.

"*Specialist.*—The following officer has been appointed specialist in the subjects noted against him:—

"Captain T. J. Halinan, specialist in electrical science, 3rd (Lahore) Divisional area."

TERRITORIAL FORCE.

London Mounted Brigade Field Ambulance.—James Wilson McIntosh, M.B. (late Lieutenant, Royal Army Medical Corps, Territorial Force), to be Captain, dated September 19, 1914; Thomas Hillier Chittenden, M.D., to be Major, dated September 23, 1914; Captain James W. McIntosh, M.B., to be Major (temporary), dated December 16, 1914; Lieutenant William F. Smartt to be Captain (temporary), dated December 16, 1914.

1st South Western Mounted Brigade Field Ambulance.—Major George Rodway Swinhoe, retired list, Territorial Force, to be Major, dated September 28, 1914; Leighton Hill Hay, M.B., to be Lieutenant, dated October 3, 1914; William Cecil Aylmer Jollands (late Second Lieutenant, 4th Volunteer Battalion, The Hampshire Regiment) to be Transport Officer, with the honorary rank of Lieutenant, dated October 3, 1914.

1st Northumbrian Field Ambulance.—John Hamilton Barclay, M.B., to be Lieutenant, dated November 18, 1914.

2nd Northumbrian Field Ambulance.—Major Duncan Alexander Cameron, M.B., to be Lieutenant-Colonel, dated October 17, 1914; Captain Duncan Vercol Haig, M.D.,

to be Major, dated October 17, 1914; Captain David Leonard Fisher, M.B., to be Major, dated October 17, 1914; Arthur Langford Bastable, M.B., to be Lieutenant, dated October 24, 1914.

3rd Northumbrian Field Ambulance.—Surgeon-Captain Clarence B. Whitehead, M.B., from the 4th Battalion, Alexandra, Princess of Wales's Own (Yorkshire Regiment), to be Captain, dated November 30, 1914.

1st Southern General Hospital.—The undermentioned to be Lieutenants, dated November 21, 1914: Stephen Grange Askey, M.B.; Alfred Percy Phillips; Percival Courtenay Cole; Ambrose Wilfred Owen, M.D. Frank Douglas Marsh (late Cadet, Cambridge University Contingent, Senior Division, Officers Training Corps), to be Captain, whose services will be available on mobilization, dated August 25, 1914.

2nd Southern General Hospital.—Captain Harold F. Mole, F.R.C.S., resigns his commission on account of ill-health, dated September 27, 1914.

4th Southern General Hospital.—Captain Gilbert J. Arnold, F.R.C.S., resigns his commission, dated October 24, 1914.

1st London General Hospital.—The undermentioned Captains to be seconded, dated October 7, 1914: William B. Ainger, F.R.C.S.; Herbert D. Clementi-Smith, M.B.; George H. L. Whale, M.D., F.R.C.S.

2nd London General Hospital.—Arthur William Ormond, F.R.C.S., to be Captain, dated September 7, 1914.

3rd London General Hospital.—Staff-Serjeant Sydney Church Leopard to be Quartermaster, with the honorary rank of Lieutenant, dated September 21, 1914. The date of appointment of Captain Dennis Embleton is September 9, 1914, and not as stated in the *London Gazette* of September 22, 1914.

4th London General Hospital.—The undermentioned to be Lieutenants, dated August 12, 1914: Henry Park Ashe, Lennard Game, George William Shore, John Everidge.

3rd Highland Field Ambulance.—The undermentioned to be Lieutenants: John Strathearn, M.B., dated September 25, 1914; George Bruce Killoh, M.B., dated September 25, 1914; Conn Britton, M.B. (late Cadet Edinburgh University Contingent, Senior Division Officers Training Corps), dated November 4, 1914.

1st Home Counties Field Ambulance.—Herbert Edward Sharp to be Quartermaster, with the honorary rank of Lieutenant, dated October 24, 1914; Captain Arthur T. Falwasser to be Major (temporary), dated December 16, 1914; Captain Antony A. Martin, M.D., from attached to units other than Medical Units, to be Captain, dated December 19, 1914. The date of appointment of Captain Arthur T. Falwasser is September 19, 1914, and not as stated in the *London Gazette* of October 13, 1914.

2nd Home Counties Field Ambulance.—Frank Buss to be Transport Officer, with the honorary rank of Lieutenant, dated November 1, 1914.

1st London (City of London) Field Ambulance.—The date of appointment of Captain Charles S. Brebner, M.D., is August 5, 1914, and not as stated in the *London Gazette* of September 8, 1914; Major Edmond W. St. Vincent-Ryan to be Lieutenant-Colonel (temporary), dated November 19, 1914; Lieutenant David J. Scott, M.D., to be Captain (temporary), dated December 16, 1914; Lieutenant Archibald Leitch, M.B., to be Captain (temporary), dated December 16, 1914; Eliezer Coplans to be Lieutenant, dated September 1, 1914; David Jobson Scott, M.D., to be Lieutenant, dated September 1, 1914.

1st London (City of London) Sanitary Company.—The date of promotion to Captain (temporary) of Lieutenant Evelyn C. Sprawson is October 2, 1914, and not as stated in the *London Gazette* of November 9, 1914. The undermentioned to be Lieutenants, dated December 15, 1914; Serjeant George White; Private Robert Jacobs; Private Charles John Dickenson Gair, from the 23rd (County of London) Battalion, The London Regiment, to be Lieutenant, dated December 19, 1914.

5th London Field Ambulance.—The undermentioned to be Lieutenants: Alfred Hugh Bell, dated September 23, 1914; John MacMillan, M.B., dated September 24, 1914; Hector Mackay Calder, M.B., dated September 25, 1914; Harold Marshall Lambert to be Transport Officer, with the honorary rank of Lieutenant, dated September 21, 1914; Herbert Ernest Balfern Ware to be Quartermaster, with the

honorary rank of Lieutenant, dated September 21, 1914; Maurice Ulick Wilson to be Lieutenant, dated September 25, 1914. The undermentioned Lieutenants to be Captains (temporary), dated December 16, 1914: John E. Sandilands, M.D., George Scott, M.B.

6th London Field Ambulance—John Edmund Bishop Wells (late Surgeon-Captain, 1st Volunteer Battalion, the Bedfordshire Regiment) to be Major, dated September 28, 1914.

2nd London (City of London) Field Ambulance.—Hubert Charles Phillips (late Captain, Royal Army Medical Corps (Volunteers) to be Captain, dated September 1, 1914; Honorary Lieutenant in the Army, William Ernest Rielly, M.B., to be Captain, dated September 20, 1914; William Gibbs Lloyd, M.B., to be Lieutenant, dated September 17, 1914.

3rd London (City of London) Field Ambulance.—Myer Coplans, M.D., to be Captain, dated September 1, 1914; Stanley Wyard, M.D., to be Lieutenant, dated September 17, 1914; Cedric Rowland Taylor, M.B., to be Lieutenant, dated September 20, 1914; Private Philip Archer Baynes to be Quartermaster, with the honorary rank of Lieutenant, dated August 29, 1914; Major John A. Masters, M.D., from attached to units other than Medical Units, to be Lieutenant-Colonel (temporary), dated December 16, 1914; Captain George L. L. Lawson to be Major (temporary), dated December 16, 1914; Lieutenant Robert Carswell, M.B., to be Captain (temporary), dated December 16, 1914.

4th London Field Ambulance.—John Muir, M.B. (late Captain, Royal Army Medical Corps, Territorial Force) to be Captain, dated September 22, 1914; John Mackay Plews to be Lieutenant, dated August 6, 1914. The date of appointment of Lieutenant Lionel G. Pearson, M.B., is October 28, 1914, and not as stated in the *London Gazette* of November 9, 1914.

2nd Northern General Hospital.—Lieutenant George P. Anning, from attached to units other than Medical Units, to be Captain, dated December 15, 1914.

3rd Northern General Hospital.—John Broadley, M.B., F.R.C.S., Edin., to be Captain, dated November 7, 1914; Archibald Young, M.B. (late Major of this Unit), to be Captains, dated November 19, 1914.

4th Northern General Hospital.—Douglas Edward Darbyshire, M.B., to be Captain dated November 17, 1914.

South Midland Clearing Hospital.—Captains Charles B. Baxter, M.B., F.R.C.S. Edin., and James L. Joyce, F.R.C.S., from attached to units other than Medical Units, to be Captain, dated December 15, 1914.

2nd London Sanitary Company.—Captain Charles M. Fegen to be Major (temporary), dated November 20, 1914; Lieutenant Frederick G. Caley to be Captain (temporary), dated October 2, 1914; Chartres Aylmer Molony to be Lieutenant, dated November 28, 1914; Francis Samuel Carson, M.B., to be Lieutenant, dated November 30, 1914; John Crawford, M.B., to be Lieutenant, dated December 3, 1914.

2nd London Clearing Hospital.—Iorwerth Hubert Lloyd-Williams to be Lieutenant, dated November 25, 1914; Eric Stuart Taylor to be Lieutenant, dated November 27, 1914.

2nd Eastern General Hospital.—William Barrington Prowse to be Captain available for service on mobilization, dated November 25, 1914.

1st Wessex Field Ambulance.—Edward Pearse Wheatley to be Quartermaster, with the honorary rank of Lieutenant, dated October 24, 1914. Lieutenant Charles H. Maskew, M.B., from the 3rd Wessex Field Ambulance, to be Lieutenant, dated October 26, 1914. George Hutchings Tapper to be Transport Officer, with the honorary rank of Lieutenant, dated October 28, 1914. The undermentioned Captains to be Majors, dated October 29, 1914: Thomas Duncan, M.B., George P. D. Hawker, M.D., Lieutenant William H. E. Stewart, from attached to units other than Medical Units, to be Captain, dated October 13, 1914.

2nd Wessex Field Ambulance.—Leonard Leighton Hanham (late Captain, Army Medical Reserve) to be Captain, dated October 16, 1914. Lieutenant Arthur C. Hincks from attached to units other than Medical Units to be Lieutenant, dated October 17, 1914. The undermentioned Captains to be Majors, dated October 29, 1914: Fielding C. Whitmore, Thomas P. Puddicombe.

3rd Wessex Field Ambulance.—Captain Elliott B. Bird to be Major, dated September 4, 1914. James Kearney to be Lieutenant, dated October 14, 1914. Major Alexander Milne-Thomson. M.B., to be Lieutenant-Colonel, dated October 29, 1914; Captain Edmund Alderson, M.D., to be major, dated October 29, 1914; Charles Balfour Stuart, M.B., to be Lieutenant, dated October 29, 1914.

1st East Lancashire Field Ambulance.—Gordon Lisk Trelawney Stocker to be Transport Officer, with the honorary rank of Lieutenant, dated November 23, 1914.

2nd East Lancashire Field Ambulance.—Captain Alexander Callam, M.B., to be Lieutenant-Colonel (temporary), dated December 1, 1914; Emor Reuben Cooper, M.B., to be Lieutenant, dated November 25, 1914; James Harvey Bounds to be Quartermaster, with the honorary rank of Lieutenant, dated December 14, 1914.

1st East Anglian Field Ambulance.—Arthur William Paterson, M.B., to be Lieutenant, dated November 29, 1914.

2nd East Anglian Field Ambulance.—Major James M. G. Bremner, M.B., to be Lieutenant-Colonel (temporary), dated October 1, 1914. Frank Sydney Cant to be Transport Officer, with the honorary rank of Lieutenant, dated October 24, 1914.

3rd East Lancashire Field Ambulance.—Gerald Gage Wray, M.B., to be Lieutenant, dated November 29, 1914.

Northumbrian Casualty Clearing Station.—Lieutenant-Colonel William E. Hume, M.B., from the 1st Northern General Hospital, to be Major, dated November 19, 1914.

Northumbrian Clearing Hospital.—John Stanley Manford, M.B. (late Captain, 3rd Volunteer Battalion, The Northumberland Fusiliers), to be Captain, dated November 16, 1914.

1st West Riding Field Ambulance.—Herbert John Robson (late Captain, Northern Command, Royal Army Medical Corps (Volunteers), Leeds Companies), to be Captain, dated October 23, 1914; Hugh Roger Partridge to be Lieutenant, dated November 23, 1914.

2nd West Riding Field Ambulance.—Ernest Herbert Beeton (late Staff-Serjeant (Acting Serjeant-Major), Royal Army Medical Corps) to be Quartermaster, with the honorary rank of Lieutenant, dated November 27, 1914.

East Anglian Casualty Cearing Station.—Major William A. Gibb, M.D., from attached to units other than Medical Units, to be Lieutenant-Colonel, dated December 24, 1914.

1st North Midland Field Ambulance.—Charles Brand Johnstone, M.B., to be Lieutenant, dated November 18, 1914; Arthur Heath, M.D., F.R.C.S., to be Lieutenant, dated November 24, 1914.

2nd North Midland Field Ambulance.—Robert Burton Meikle Yates, M.B. (late Cadet, Sedbergh School Contingent, Junior Division Officers Training Corps), to be Lieutenant, dated September 22, 1914; Edward Crawford Trench Emerson, M.B., to be Lieutenant, dated November 19, 1914; Samuel Russel Foster, M.B. (late Cadet Serjeant, Belfast University Contingent, Senior Division, Officers Training Corps), to be Lieutenant, dated November 27, 1914.

1st South Midland Field Ambulance.—Gerard Thomas Andrewes Uthwatt to be Transport Officer, with the honorary rank of Lieutenant, dated September 21, 1914; Lieutenant Cyril R. Wallace, from the 2nd South Midland Field Ambulance, to be Lieutenant, dated December 19, 1914.

2nd South Midland Mounted Brigade Field Ambulance.—Humphrey Francis Humphreys, M.B., to be Lieutenant, dated September 18, 1914; Transport Officer and Honorary Lieutenant William E. H. Bull resigns his commission, dated October 15, 1914; William Edward Hugh Bull (late Transport Officer and Honorary Lieutenant) to be Lieutenant, dated October 15, 1914.

3rd Lowland Field Ambulance.—Richard John Robertson (late Staff-Serjeant, 2nd Scottish General Hospital) to be Quartermaster, with the honorary rank of Lieutenant, dated November 1, 1914. The date of appointment of Lieutenant William W. Greer, M.D., is September 30, 1914, and not as stated in the *London Gazette* of November 2, 1914.

Attached to Units other than Medical Units.

Julius Henry Beilby, M.B. (late Surgeon-Captain, Worcestershire (Queen's Own Worcestershire Hussars) Imperial Yeomanry), to be Captain, dated September 5, 1914.

Ernest Edward Balman Landon to be Lieutenant, dated October 1, 1914.

Lieutenant Herbert W. Joyce, from 1st North Midland Field Ambulance, to be Lieutenant, dated November 11, 1914.

George Crawshaw, M.B., to be Lieutenant, dated November 23, 1914.

Frederic Ernest France, M.B., to be Lieutenant, dated November 27, 1914.

Unattached List for the Territorials.

Lieutenant Herbert Vawdrey Capon, from 2nd East Anglian Field Ambulance, to be Lieutenant, dated November 28, 1914.

Lieutenant Charles Frederick Searle, M.B., from 1st East Anglian Field Ambulance, to be Lieutenant, dated November 28, 1914.

Lieutenant Frederick Claude Kempson, M.B., from 3rd East Anglian Field Ambulance, to be Lieutenant, dated November 28, 1914.

Austen Andrew Bearne to be Lieutenant, dated November 1, 1914.

Lieutenant Daniel R. Kilpatrick, M.D., to be Captain, dated November 5, 1914.

Robert David Cran to be Lieutenant, dated November 11, 1914.

John Carrington Marklove to be Lieutenant, dated November 20, 1914.

Charles Gerald Trench, M.B., to be Lieutenant, dated November 14, 1914.

Louis Bruce Stringer to be Lieutenant, dated November 25, 1914.

Rowland Lewis Thomas to be Lieutenant, dated November 26, 1914.

Ashley Scott Hopper, M.B., to be Lieutenant, dated November 1, 1914.

Josiah Field Hall, M.B. (late Surgeon-Captain, 3rd Volunteer Battalion, The Queen's (Royal West Surrey Regiment), to be Captain, dated November 21, 1914.

Leslie Mordaunt Ladell, M.B., to be Lieutenant, dated November 27, 1914.

Thomas Sanders Worboys (late Lieutenant, Royal Army Medical Corps, Territorial Force) to be Captain, dated December 4, 1914.

Lieutenant Edward C. B. Paul, M.B., F.R.C.S., is seconded, dated December 8, 1914.

George Hooper Rains, to be Lieutenant, dated December 15, 1914.

Major Thomas H. Chittenden, M.D., from London Mounted Brigade Field Ambulance, to be Major, dated December 16, 1914.

Arthur Lindsay Maury Churchill to be Lieutenant, dated December 17, 1914.

Lieutenant John T. Shaw, M.D., resigns his commission on account of ill-health, dated December 19, 1914.

ROYAL ARMY MEDICAL COLLEGE.

LIST OF BOOKS ADDED TO THE LIBRARY DURING THE MONTHS OF OCTOBER, NOVEMBER AND DECEMBER, 1914.

Title of Work and Author	Edition	Date	How obtained
Operative Surgery, Head and Neck, Thorax, Abdomen. By Edward H. Taylor, M.D.		1914	Library Grant.
Technical Methods of Chemical Analysis. Edited by George Lunge, Ph.D. English Translation, edited by C. A. Keane, D.Sc. Vol. iii. Parts 1 and 2		1914	,, ,,
Yellow Fever Commission (West Africa). First Report and Second Report		1914	Editor, Journal.
Smithsonian Miscellaneous Collections. Vol. lxiii. No. 1. Atmospheric Air in Relation to Tuberculosis. By Guy Hinsdale, M.D.		1914	,, ,,
Transactions of the London Dermatological Society, January, 1913, to August, 1914		1914	,, ,,
Report from the Select Committee on Patent Medicines		1914	Commandant's Office.
University of London. The Calendar for the Year 1914-15		1914	,, ,,
University of London. Regulations for External Students. September, 1914		1914	,, ,,
Nairobi Laboratory Report. Vol. iv. Part 1 ..		1914	,, ,,
Indian Sanitary Policy		1914	,, ,,
Military Report on Rhodesia. Prepared by the General Staff, War Office		1913	War Office.
Statistical Report of the Health of the Navy for the Year 1913		1914	Director-General Medical Department, Admiralty.
Fauna of British India. Mollusca. Vol. ii. (Trochomorphidæ—Janellidæ). By G. K. Gude, F.Z.S.		1914	Secretary of State for India in Council.
Cambridge Public Health Series. The Bacteriological Examination of Food and Water. By W. G. Savage, M.D.		1914	The Syndics of the Cambridge University Press.
The Chemical Examination of Water, Sewage, Foods and other Substances. By J. E. Purvis, M.A., and T. R. Hodgson, M.A.		1914	,, ,,
A New and Improved Edition of Dr. Buchan's Domestic Medicine; or, A Treatise on the Prevention and Cure of Diseases, by Regimen and Simple Medicine		1806	Presented by Deputy Surg.-General W. G. Don, M.D.
Medical Service in Campaign. By Major P. F. Straub, Medical Corps, U.S. Army.	2nd	1912	Presented by P. Blakiston's Son and Co., through Mr. H. K. Lewis.
First-Aid Dentistry. By E. P. R. Ryan		1914	,, ,,
Outlines of the Science and Practice of Medicine. By W. Aitken, M.D., F.R.S.	2nd	1882	Presented by Surgeon-General Sir D. Bruce, C.B., F.R.S.

LIST OF BOOKS ADDED TO THE LIBRARY—*Continued.*

Title of Work and Author	Edition	Date	How obtained
The Growth of the Recruit and Young Soldier. By Sir W. Aitken, M.D., F.R.S.	2nd	1889	Presented by Surgeon-General Sir D. Bruce, C.B., F.R.S.
Animal Alkaloids. By Sir W. Aitken, M.D., F.R.S.	2nd	1889	,, ,,
The Surgery of the Diseases of the Appendix Vermiformis and their Complications. By Battle and Corner		1904	,, ,,
Plumbing, House Drainage, etc. By W. P. Buchan	6th	1892	,, ,,
Clinical and Pathological Observations on Acute Abdominal Diseases. By E. M. Corner		1904	,, ,,
Il Clima di Roma. By C. Tommasi-Crudeli ..		1886	,, ,,
Sleeping Sickness in the Island of Principe. By D. F. B. Da Costa		1913	,, ,,
Natural Law in the Spiritual World. By H. Drummond		1884	,, ,,
A Course of Elementary Practical Histology. By W. Fearnley		1887	,, ,,
The Collected Scientific Papers of the late W. A. Forbes. Edited by F. E. Beddoes, M.A.		1885	,, ,,
Mediterranean, Malta or Undulant Fever. By Surgeon-Captain M. L. Hughes, M.S.		1897	,, ,,
The Treatment of Syphilis. By Lieut.-Col. F. J. Lambkin, R.A.M.C.		1905	,, ,,
Anatomie Clinique et Technique Opératoire. Par Dr. O. Laurent		1906	,, ,,
Traité du Paludisme. Par A. Laveran	2nd	1907	,, ,,
The Microtomist's Vade-Mecum. By A. B. Lee ..		1896	,, ,,
Incipient Pulmonary Tuberculosis. By D. B. Lees		1913	,, ,,
Defective Vision in Soldiers. By T. Longmore ..		1875	,, ,,
Investigation into the Disease of Sheep called "Scrapie." By J. P. McGowan		1914	,, ,,
Recherches de Parasitologie et de Pathologie humaines et animales au Tonkin. Par C. Mathis et M. Leger		1911	,, ,,
Experiments on Animals. By Stephen Paget ..	3rd	1906	,, ,,
A Treatise on Epizootic Lymphangitis. By Capt. W. A. Pallin	2nd	1904	,, ,,
Cholera and its Treatment. By L. Rogers ..		1911	,, ,,
The Nature and Treatment of Cancer. By J. A. Shaw-Mackenzie		1905	,, ,,
Recherches Expérimentales sur la Pathologie Algérienne (Microbiologie, Parasitologie), 1902-1909. Par le Dr. Edmond Sergent		1910	,, ,,
Lectures on Surgery. By James Spence. 2 vols.		1875-76	,, ,,
Blood Stains: Their Detection, etc. By Major W. D. Sutherland, I.M.S.		1907	,, ,,
The Röntgen Rays in Medical Work. By D. Walsh	4th	1907	,, ,,
The Influence of Cod-liver Oil on Tuberculosis. By J. W. Wells		1907	,, ,,
Methods of Research in Microscopical Anatomy and Embryology. By C. O. Whitman		1885	,, ,,
Veterinary Medicine. By W. Williams	7th	1893	,, ,,
Natal Birds. By B. J. and J. D. S. Woodward ..		1889	,, ,,
British Association, South Africa, 1905. Contributions to Education in South Africa		1905	,, ,,

LIST OF BOOKS ADDED TO THE LIBRARY—*Continued.*

Title of Work and Author	Edition	Date	How obtained
Ministry of Education, Egypt. School of Medicine. Catalogue of the Pathological Museum. By A. R. Ferguson, M.D.		1910	Presented by Surgeon-General Sir D. Bruce, C.B., F.R.S.
Seventeenth International Congress of Medicine, London, 1913. Catalogue of the Museum in English, French, and German. By H. W. Armit		1913	,, ,,
Medico-Chirurgical Transactions. Vols. lxxxvi, lxxxviii, and lxxxix		1903-06	,, ,,
Proceedings of the Royal Colonial Institute. Vols. xxxv to xl		1903-09	,, ,,
Proceedings of the Royal Institution of Great Britain. Vol. xix. Parts I and II		1911	,, ,,
Report of the British Association for the Advancement of Science, 1905, and 1907 to 1913		1905-13	,, ,,
Report on Plague in India. Vol. i. Parts I and II		1911	,, ,,
Rapport de la Mission d'Etudes de la Maladie du Sommeil au Corps Français, 1906-1908		1909	,, ,,
Rapport sur les Travaux de la Mission du Katanga (October, 1910, à September, 1912)		No date	
Royal Colonial Institute Year-book		1914	,, ,,
Year-book of the Royal Society of London, 1899-1913		1899-1913	,, ,,
University of Aberdeen. Record of Quatercentenary		1906	,, ,,
The University of Liverpool Calendar, 1905-08 ..		1905-08	,, ,,
Trinity College, Dublin. Speeches of Public Orators		1909	,, ,,
A Record of the Progress of the Zoological Society of London during the Nineteenth Century		1909	,, ,,
The M'Fadden Researches, 1913-14.			
Vol. iii. Induced Cell-Reproduction and Cancer. By H. C. Ross		1913	
Vol. iv. Researches into Induced Cell-Reproduction in Cancer. By J. W. Cropper and A. H. Drew		1914	,, ,,
Dictionary of Medical Terms, English-French-German. By Paul Blaschke		1907	,, ,,
Dictionary of Medical Conversation, English-German. By Paul Blaschke		1907	,, ,,
Dictionary of Medical Conversation, German-English. By Paul Blaschke		1907	,, ,,

BIRTH.

SIDGWICK.—On December 13, at Ashby Parva Rectory, Lutterworth, the wife of Captain H. C. Sidgwick, R.A.M.C., of a son.

DEATHS.

GLANVILL.—Captain Ernest Mure Glanvill, M.B., R.A.M.C., was killed in action in Belgium on November 2, 1914, aged 36.

JOHNSTON.—Colonel William Johnston, C.B., M.D., retired, Army Medical Staff, died at Murtle, Aberdeen, on December 26, 1914, aged 71.

McGILL.—On October 20, near Bath, Colonel Harry Strickland McGill, Army Medical Service (Retired) aged 53, only son of the late Captain William Strickland McGill, 79th Cameron Highlanders.

RANKEN.—Captain Harry Sherwood Ranken, V.C., M.B., R.A.M.C., died of wounds received in action, September 25, 1914, aged 31.

EXCHANGES, &c.

The charge for inserting Notices respecting Exchanges in the Royal Army Medical Corps is 5/- for not more than five lines, which should be forwarded by Cheque or P.O.O., with the notice, to Messrs. G. STREET and CO., Ltd., 8, *Serle Street, London, W.C., not later than the* 22*nd of the month.*

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25	4	0 3 0	0 1 3	4 0	1 3	3 6	0 9
	8	0 5 6	0 2 6				
	16	0 9 6	0 4 6				
50	4	0 4 0	0 1 8	5 0	1 9	4 0	1 0
	8	0 6 9	0 3 2				
	16	0 12 0	0 5 3				
100	4	0 5 6	0 2 9	6 6	3 3	5 6	2 0
	8	0 9 0	0 4 4				
	16	0 16 9	0 6 9				
200	4	0 8 6	0 4 0	9 0	6 3	7 6	4 0
	8	0 13 6	0 6 0				
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Notices.

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, etc. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts, and commands at home and abroad.

All such Communications or Articles accepted and published in the "Journal of the Royal Army Medical Corps" will (unless the Author notifies at the time of submission that he reserves the copyright of the Article to himself) become the property of the Library and Journal Committee, who will exercise full copyright powers concerning such Articles.

Matter intended for the Corps News should reach the Editor not later than the 15th of each month for the following month's issue. Notices of Births, Marriages, and Deaths are inserted free of charge to subscribers and members of the Corps. All these communications should be written upon one side of the paper only; they should by preference be type-written, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed The Editor, "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS," War Office, Whitehall, London, S.W.

Communications have been received from Captain D. McFadyen, Colonel C. Birt, Captain W. R. Galwey, Captain G. K. Aubrey.

The following publications have been received:—

British: Proceedings of the Royal Society of Medicine, Guy's Hospital Gazette, The Journal of State Medicine, Annals of Tropical Medicine and Parasitology, Proceedings of the Royal Society, The Lancet, Medical Press and Circular, Public Health, The Journal of Tropical Medicine and Hygiene. The Hospital, The Medical Review, The Indian Medical Gazette, Medical Journal of Australia, Indian Journal of Medical Research (4 *vols.*)*, Indian Medical Gazette, Red Cross and Ambulance News, The St. Thomas's Hospital Gazette, Yellow Fever Bureau Bulletin, The Royal Engineers' Journal, St. Bartholomew's Hospital Journal, The Indian Medical Journal, The Red Cross, Tropical Diseases Bulletin, Journal of the Royal United Service Institution, Transactions of the London Dermatological Society, The Medical Journal of South Africa, The Practitioner, The Hibbert Journal, Journal of the United Service Institution of India, Transactions of the Society of Tropical Medicine and Hygiene.*

Foreign: Giornale di Medicina Militare, Bulletin de l'Institut Pasteur, Revista de Sanidád Militar, The Philippine Journal of Science, The Military Surgeon, Bulletin of the Johns Hopkins Hospital, Tidskrift i Militär Hälsovard, United States Public Health Service, Office International d'Hygiene Publique, Archives de l'Institut Pasteur de Tunis, United States Naval Medical Bulletin, Annali di Medicina Navale e Coloniale, Bulletin de la Société de Pathologie Exotique, The Journal of Infectious Diseases, Journal of Agricultural Research, The American Surgeon.

MANAGER'S NOTICES.

The Journal of the Royal Army Medical Corps is published monthly, six months constituting one volume, a volume commencing on 1st July and 1st January of each year.

The Annual Subscription is £1 (which includes postage), and should commence either on 1st July or 1st January; but if a subscriber wishes to commence at any other month he may do so by paying for the odd months between 1st July and 1st January at the rate of 1s. 8d. (one shilling and eightpence) per copy. (All subscriptions are payable in advance.)

Single copies can be obtained at the rate of 2s. per copy.

The Corps News is also issued separately from the Journal, and can be subscribed for at the rate of 2s. (two shillings) per annum, including postage. Subscriptions should commence from 1st July each year; but if intending subscribers wish to commence from any other month, they may do so by paying for the odd months at the rate of 2d. per copy. (All subscriptions are payable in advance.)

Officers of the Royal Army Medical Corps possessing Diplomas in Public Health, etc., are kindly requested to register their special qualifications at the War Office. Letters of complaint are frequently received from officers stating that their special qualifications have not been shown in the Distribution List which is published as a supplement to the Journal in April and October of each year. As, however, the particulars of this list are supplied from official sources, officers are reminded that unless the possession of Diplomas, etc., has been registered at the War Office, no entry of such qualifications can be recorded in the Distribution List.

Letters notifying change of address should be sent to the Hon. Manager, "Journal of the Royal Army Medical Corps," War Office, Whitehall, London, S.W., and must reach there not later than the 20th of each month for the alteration to be made for the following month's issue.

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The Hon. Manager,
"Journal of the Royal Army Medical Corps,"
War Office, Whitehall, S.W.

JOURNAL

OF THE

ROYAL ARMY MEDICAL CORPS.

Corps News.

December, 1914.

ARMY MEDICAL SERVICE.

Dated November 6, 1914.—Brevet-Colonel William H. Horrocks, M.B., is appointed an Honorary Surgeon to The King, *vice* Surgeon Major-General Sir J. B. C. Reade, K.C.B.

Royal Army Medical Corps.

The undermentioned to be temporary Quartermasters, with the honorary rank of Lieutenant:—

Dated December 10, 1914.—Harry John Ford.
Dated December 19, 1914.—Robert James Allwork.
Dated December 23, 1914.—Alfred James Francke.
Dated December 25, 1914.—Henry Williams.
Dated December 26, 1914.—Robert Watson.
Dated December 28, 1914.—John Frederick Ford.
Dated December 30, 1914.—Alfred Bellatti, Samuel Sulley.
Dated January 10, 1915.—William Carey.
Dated January 11, 1915.—James Thomas Walter Hayward, Alfred William Holding.
Dated January 15, 1915.—Frank Jones.

The undermentioned Lieutenants are confirmed in their rank:—

William C. Hartgill, Cecil S. Staddon, William M. Dickson, Frederick M. Lipscomb, Johan F. van der Westhuyzen, Gifford T. van der Vyver, Allan B.·Hawkins, Andrew R. Ross, Robert W. S. Murray, Claude H. Fischel, James B. Fotheringham, William H. Elliott, Harry P. Rudolf, Joseph P. Quinn, James Swan, Thomas G. Fleming, John H. Sewart, Leo B. C. Marksman, Douglas N. Macleod, Frank M. Barnes, James L. McBean, Alexander G. S. Wallace, Edgar L. F. Nash, Richard P. Starkie.

Captain William McC. Wanklyn, Sanitary Service, is appointed Deputy Assistant Director of Medical Services, North Midland Division, dated January 13, 1915.

Lieutenant-Colonel Conrad T. Green, from the Welsh Casualty Clearing Station, to be Assistant Director of Medical Services, Welsh Reserve Division, and to be granted the rank of Colonel (temporary), dated January 15, 1915.

Lieutenant-Colonel Harry T. Challis, M.D., from the 3rd East Anglian Field Ambulance, to be Assistant Director of Medical Services, East Anglian (Reserve) Division, with the temporary rank of Colonel, dated January 17, 1915.

Colonel Thomas J. O'Donnell, D.S.O., is retained on the active list under the provisions of Article 120, Royal Warrant for Pay and Promotion, and to be supernumerary, dated January 18, 1915.

Peter Macdiarmid, M.B., is granted temporarily the honorary rank of Captain, dated January 27, 1915.

Honorary Major Guy N. Stephens to be temporary Lieutenant-Colonel, dated January 10, 1915.

Charles Vincent Mackay, M.D., to be temporary Major (substituted for the notification which appeared in the *Gazette* of December 19, 1914), dated December 2, 1914.

The undermentioned to be temporary Captains:—

Dated November 5, 1914.—Gordon Morgan Holmes, M.D.

Dated December 16, 1914.—Robert Sewers Berry.

Dated December 21, 1914.—Edwin Arthur Peters, M.D., F.R.C.S.; Arthur Robert Owst, F.R.C.S.Edin.

Dated December 23, 1914.—John Davies.

Dated December 28, 1914.—Temporary Lieutenant Robert Higham Cooper.

Dated December 29, 1914.—Charles Edward Forbes Mouat-Biggs.

Dated January 4, 1915.—Robert Sturgeon Cocke, F.R.C.S.Edin.

Dated January 6, 1915.—Charles Ravenscroft Stewart, M.B.

Dated January 15, 1915.—Henry Wynyard Kaye.

Temporary Captain Frederick F. Bond, M.D., resigns his commission, dated January 9, 1915.

The undermentioned to be temporary Captains whilst serving with the Duchess of Westminster's War Hospital:—

Dated January 6, 1915.—Charles Samuel Myers, M.D.; Thomas Munn Body.

The undermentioned Lieutenants to be Captains:—

Dated January 28, 1915.—Basil H. H. Spence, M.B.; William B. Laird; Robert Davidson, M.B.; Herbert S. Blackmore; James M. Elliott, M.B.; Francis R. B. Skrimshire; Douglas W. Bruce, M.B.; Thomas E. Osmond; Richard T. Vivian; Edward G. H. Cowen, M.B.; Leonard Buckley, M.B.; William L. Webster, M.B.; Edward B. Allnutt; Stanley P. Sykes, M.B.; Harry C. Todd, M.B.; Henry J. G. Wells, M.B.; Ernest C. Deane; Frank S. Tamplin; Ivor R. Hudleston; William Stewart, M.B.; Alexander G. J. MacIlwaine; Arthur S. Heale.

The undermentioned Officers, Home Hospitals Reserve, are granted the temporary rank of Captain:—

Dated August 6, 1914.—J. E. Moorhouse, M.D.

Dated August 14, 1914.—D. M. Barry.

Dated January 4, 1915.—A. B. Leakey, M.B.

Fred D. Bird, M.B., to be temporary Lieutenant-Colonel, dated December 3, 1914.

Temporary Lieutenant Alfred G. Stewart relinquishes his commission, dated January 10, 1915.

Temporary Lieutenant Philip L. Davies resigns his commission, dated January 10, 1915.

Temporary Lieutenant Thomas Renton Elliott, M.D., to be temporary Captain, dated January 14, 1915.

Frank Clark to be temporary Quartermaster, with the honorary rank of Lieutenant, dated January 1, 1915.

The undermentioned to be temporary Lieutenants:—

Dated September 3, 1914.—Arthur Martin Leake, V.C.

Dated September 23, 1914.—Frank Dallimore, M.B.

Dated October, 1,1914.—Philip Heinrich Bahr, M.D.

Dated October 10, 1914.—Owen Richards.

Dated October 12, 1914.—Alfred Squire Taylor, M.B.

Dated October 24, 1914.—Alfred George Stewart, M.B.

Dated November 17, 1914.—James Anthony Delmege.

Dated November 22, 1914.—John Cuthbert Matthews, M.B.

Dated November 25, 1914.—Hugh Hercus Cavendish Fuller, M.B.

Dated November 27, 1914.—Charles Aloysius Kenny.

Dated December 5, 1914.—Alfred Cecil Edwards, M.B.

Dated December 7, 1914.—Bertram Mayhew Bone, M.B., F.R.C.S.Edin.; William James Gifford Gayton; Hans Fleming, M.B.; George William Fleming.

Dated December 8, 1914.—James Alexander Hendry, M.B.; John Daniel Harmer, M.B., F.R.C.S.; Carl Joseph Barrett Buchheim, M.B.; Frank Anthony Cooke, M.D.; Arthur John Ormsby Wigmore, M.B.; James Aubrey Ireland.

Dated December 9, 1914.—Arthur Vernon Stocks, M.B.

Dated December 10, 1914.—Victor Vesselovsky; Wilfrid Henry Waller Attlee, M.D.; Allan Read Wilson, M.D.; William Hugh Steele, M.B.

Dated December 11, 1914.—Noel Ravenchil Rawson, M.B.; David Hutcheon Paul, M.D.

Dated December 14, 1914.—Donald John Gollan Grant, M.B.; Richard Till

Worthington, M.B.; James McKee Ferguson; Martin Hallam; Stephen Nockolds. M.B.

Dated December 15, 1914.—George Barrowclough Horrocks; Herbert Park Shackleton, M.B.; Archibald Hector Maccoll Robertson, M.B.; William Brown; James Maud Rishworth, M.B.; Wilfrid Robert Pagen.

Dated December 16, 1914.—David Henry Griffiths; David William Jones; Gwilym Llewelyn Pierce; William Frederick Gibson, M.B.; John Allan: John Henry Herbert Pearson, M.D.; George Edward Genge-Andrews, M.B.; Charles Cavanagh; Rhys Vaughan Powell; John Cornock Hawkes; James Jack, M.B.; Edward Sandwith Johnson, M.D.; William John Henry, M.B.; William Readman. M.B.; Harold Wacher, M.B.; Erskine Herbert Worth; Charles Thompson Bishop, M.B.; Herbert Roycroft Ford, M.B.; John Bruce Low, M.B.; Alexander Mearns, M.B.; Ernest Godfrey Wheat, M.D.; Walter William Hallchurch, M.B.; Edward Seymour Chapman, M.D.; Matthew James Johnston, M.B.; John Duffin, M.B.; Robert Best Jackson; Francis Joseph Ord King, M.B.; Edward Percival Hadden Vickery, M.B.; Eric Alfred Lumley, M.B.; John William Grice; John Grimson Moseley; William Ernest Graves; Oswald Arnold Gee, M.B.; Eric Alfred Wright, M.B.; Edward Henry Allon Pask, M.D.; George Macleod, M.B.; Douglas Elder, M.B.; James Johnston Sinclair, M.B.; Samuel Burnside Boyd Campbell, M.B.; Ernest Guy Robertson.

Dated December 18, 1914.—Edward Loggie Middleton, M.B.; Edward Ernest Hobson, M.B.; Leslie Ellis Pimm; Samuel Lyle, M.B.; Geoffrey Richard Heard; John Bertram McCabe, M.B.; William McHutchison Binning; Evan Evans, M.B.; Edmund Christie Fawcett, M.B.; John Chisholm, M.B.; James Lee, M.D.; George Ramsey Phillips; Frank Hendry Rae; Philip Hugh Rawson; George Richardson, M.D.; William George Thompson, M.D., F.R.C.S.Edin.; James Stewart Hall, M.B.; Hugh Llewellyn Apthorp, M.D.; Edward Forbes, M.B.; Donald Campbell, M.B.

Dated December 19, 1914.—Harold Cane Godding; William Richard Spencer Watkins, M.B., F.R.C.S.Edin.

Dated December 20, 1914.—Alexander Emil Albert Burkhard, M.B.; Francis Graham Crookshank, M.D.; Thomas James Logan Thompson, M.B.; Alfred George Caldwell, M.D.; Ernest Edwin Tallent Nuthall, M.D.

Dated December 21, 1914.—William Miller, M.D.; Thomas John Burton, M.D.; Robert Percy McDonnell, F.R.C.S.I.; Harry Godfrey Massy-Miles; Arthur George Grant Plumley, M.B.; Kenneth Dobing Bean, M.B.; Philip John Ambrose Seccombe, M.B.; William Stewart Dickie, F.R.C.S.; Joseph Graham, M.B.; Edward William Lawrence, M.B.; Harry Spencer Hall: George Pirie, M.B.; Geoffrey Bower Richardson; Kenneth Goodall Hearne, M.B.; Percival Butler; Alexander Campbell White Knox, M.B.; Robert John Jones; Albert Edmund Samuel Martin; Charles Sand, M.B.; Herbert Harland Raw; George Llewellyn Brunton, M.D.; Roland Henry Fletcher.

Dated December 22, 1914.—Donald Olson Riddel, M.B.; Arthur William Stark Christie, M.B., F.R.C.S.Edin.; James Edward Cook, M.B.; Francis De Sales McMenamin, M.B.

Dated December 23, 1914.—Leslie Charles Johnston; George Mitchell, M.D.; Archibald Langwill, M.B.; Alfred Squire Taylor, M.B.; Lacey Bathurst, M.B.

Dated December, 24, 1914.—John Warwick.

Dated December 28, 1914.—Jerome Ivo O'Sullivan, M.B.; Michael Sullivan; Robert Archibald Slater Sunderland; Mortimer Hynes, M.B.; Norman Garfield Thornley, M.B.; James Sackville Martin, M.D.; Robert McLeod Veitch, M.D.; Edward Mansfield, M.B.; John Hannay Douglas. M.D.; Martin Melvin Cruickshank, M.B.; David Cochrane Hanson, M.B.; William de Malet Peyton, M.B.; Harrold John Pickering; David Haig; Alan Everley Taylor, M.B.; Edgar Coningsby Myott, M.D.; Harry Stanger; Sylvester Davidson Fairweather, M.B.; Hugh Faulkner, M.D.; Henry William Turner; Peter Reid, M.B.; James Allison, M.B.; Herbert Donald Robertson, M.B.; Cyril Charles Coleby Kirke White; Charles Henry Nash; James Gaston, M.B.; Henry Traill Simpson.

Dated December 29, 1914.—Frederick Pearson Fisher, M.B.

Dated December 30, 1914.—Alexander Kirkpatrick Cosgrave, M.B.; William Norman Watson, M.B.; Harold Benge Atlee, M.D.; Leslie Douglas Roberts, M.B.; Ellis Thomas Evans; Samuel Robert Richardson, M.D.; Harry Hunter Carter, M.B.; Richard Ernest Sedgwick, M.D.; Frederick Dearden Walker, M.B.; William Taylor, M.B.

Dated December 31, 1914.—Hubert Cowell Mulkern; Francis O'Neill; George

Thomson Mowat, M.B. : Mortimer Henry Pearson, M.B. ; John Samuel Martin ; John Gibson, M.B. ; Ronald Bute Macfie, M.B., F.R.C.S.Edin.

Dated January 1, 1915.—Robert Hilton Hutchinson ; William Herbert Clements ; James Douglas Driberg.

Dated January 2, 1915.—Ernest Leon Maunsell Hackett ; Conwy Llewellyn Morgan, M.D. ; Anthony Hagarty Corley.

Dated January 3, 1915.—Norman Peace Lacy Lumb, M.B. ; Dawson Cameron Robertson, M.B.

Dated January 4, 1915.—Arthur Hyde Greg, M.B., F.R.C.S. ; Ralph Anderson Hughes, M.D.

Dated January 5, 1915.—James Edmund Rutherfurd, M.B.

Dated January 6, 1915.—Charles Edward Pepper, M.B.

Dated January 7, 1915.—Harold Benjamin Day, M.D. ; Harold Kempsey, M.B. ; Thomas Burns Marshall, M.B. ; Daniel Brough, M.B. ; Edward Verdon Russell Fooks ; Thomas Langton Butler ; George Fitzjames Darker, M.D. ; Herbert Eustace Clarke ; Robert Wilkinson Greatorex, M.B. ; Howard George Pesel, M.D. ; James Donald Finlay, M.B. ; Andrew Grant, M.B. ; George Douglas Sherwood ; Thomas Lister Llewellyn, M.D. ; Bernard Creasy Ewens ; John Laing Annan, M.B. ; Wilfred Garton ; George Henry Steven, M.B. ; Dudley Forde, M.D. ; Albert Ernest Hodgson, M.D. ; James Joseph Keirans, M.B. ; John Lang, M.B.

Dated January 8, 1915.—Henry Percy Harpur, M.B. ; James Fettes, M.B.

Dated January 9, 1915.—Robert Cecil Leonard, M.D. ; Jerome O'Flynn, M.B. ; Bernard Charles Tennent, M.D.

Dated January 10, 1915.—Arthur Riley, M.B. ; Frederick Harris, M.B. ; William Edgsworth David, M.B. ; Walter Timothy James, M.B. ; Robert Kay Nisbet ; Thomas Marron, M.B.

Dated January 11, 1915.—Henry Speldewinde de Boer ; George Alexander Connell Gordon, M.B. ; David Heron, F.R.C.S,Edin.

Dated January 12, 1915.—Humphrey Rivers Pollock ; Cyril Aubrey Smallhorn, M.B. ; Bernard Ernest Wall, M.B. ; Robert James D'Arcy Irvine, M.B. ; Finbar John Hunt, M.B. ; Albert Jones, M.D. ; Robert Francis Jones ; Robert Yelverton Stones, M.B., F.R.C.S.Edin. ; George Oliver Maw.

Dated January 14, 1915.—Arthur Hines, M.B.

Dated January 15, 1915.—Walter Winslow, M.B. ; Douglas Green, M.B., F.R.C.S. ; Arthur Charles Douglas Firth, M.D. ; Cecil Banting, M.D., F.R.C.S. ; Claude Hollingworth Philips ; Thomas Joseph Kelly ; Clive Justin Hicks Sharp, M.B. ; Charles Francis Orr White ; Robert Campbell Begg, M.B. ; Ernest Stewart Dixon, M.B. ; Maurice Mackenzie.

Dated December 9, 1914.—Lieutenant Ernest R. Walker relinquishes his temporary commission.

Dated January 19, 1915.—Lieutenant John Spencer-Daniell, M.B., relinquishes his temporary commission.

The appointment to a temporary Lieutenancy of William Hector Wotton, notified in the *Gazette* of December 11, 1914, is cancelled.

Lieutenant Edward M. Woodman, F.R.C.S., relinquishes his temporary commission.

The undermentioned to be temporary Lieutenants whilst serving with the Red Cross Hospital, Netley :—

Dated January 19, 1915.—Donovan Blaise Pascall ; Walter Gibson Marsden.

SPECIAL RESERVE OF OFFICERS.

Royal Army Medical Corps.

Dated November 24, 1914.—Lieutenant Donald Aucutt relinquishes his commission.

Dated January 16, 1915.—Lieutenant William H. Johnston resigns his commission.

The undermentioned Lieutenants to be confirmed in their rank : Robert A. Anderson ; Hallowes L. Addison ; John G. Bennett ; George B. Hadden ; Francis J. Hallinan ; Thomas P. Inglis ; William M. Lansdale ; Francis C. Lapage ; David S. Martin ; Thomas Sheedy.

Dated December 21, 1914.—Francis Antrobus Duffield.

Dated January 1, 1915.—John Joseph Molyneaux.

Dated January 2, 1915.—Frederic Sanders ; George Stephen Pirie.

Dated January 7, 1915.—Edwin John Bradley.

Dated January 9, 1915.—Frank Oppenheimer.

Dated January 11, 1915.—James Walker Wood; George Macdonald Scott; Douglas G. Evans; Charles C. Iles; Frank Griffith; John P. Mitchell; Ronald G. J. McEntire; Edward C. Linton; Ennis R. Chambers; John L. Perceval; Alexander Glen; William Barclay; Alfred L. Robertson; Oswald C. S. Tandy; John L. Kilbride; Clement Lovell; Daniel Dougal; Frank G. Lescher; William Johnson; John H. Pendered; Francis Balkwill; Edmund B. Jones; James Vallance; Joseph A. L. Wilson; Ernest Talbot; George R. Bruce; Geoffrey Marshall; William Dunlop; Henry K. V. Soltau; George Dalziel; Alfred J. Clark; William G. Shakespeare; Peter W. Ransom; Joseph I. Lawson; John E. Allan; William McCombie; James Y. Moore; Gerald P. Kidd; Trevor B. Heaton; Harry E. B. White; Kenneth K. Drury; George M. Roberts.

The undermentioned Cadets and ex-Cadets of the Officers Training Corps to be Lieutenants (on probation):—

Dated August 17, 1914.—David Stanley Martin.

Dated November 30, 1914.—John George Bennett.

Dated December 7, 1914.—George Brownrigg Hadden; Hallowes Lloyd Addison.

The undermentioned to be Lieutenants (on probation):—

Dated November 10, 1914.—Robert Alexander Anderson.

Dated November 27, 1914.—William Morris Lansdale.

Dated November 30, 1914.—Thomas Pollock Inglis; Francis Claud Lapage.

Dated December 4, 1914.—James Francis Quigley.

Dated December 7, 1914.—Francis Joseph Hallinan.

Dated December 15, 1914.—Howell Meyrick Williams.

Dated December 18, 1914.—Henry Parkes Whitworth.

TERRITORIAL FORCE DECORATION.

The King has been graciously pleased to confer the Territorial Decoration upon the undermentioned officers of the Territorial Force, who have been duly recommended for the same under the terms of the Royal Warrant, dated August 17, 1908:—

Army Medical Staff.

Colonel James Harper, M.D.

Royal Army Medical Corps.

1st West Lancashire Field Ambulance, Lieutenant-Colonel John J. O'Hagan, M.B., F.R.C.S.I.

Major Henry D. A. Blumberg attached to the 7th Battalion, The King's (Liverpool Regiment).

The King has been pleased to confer the Military Cross upon the undermentioned Officers and Warrant Officers, who have been duly recommended for the same under the terms of the Royal Warrant:—

Royal Army Medical Corps.

Captain H. Stewart, M.B.
Captain E. D. Caddell, M.B.
Lieutenant C. Helm.
Lieutenant (temporary) E. J. Wyler, M.D.
Serjeant-Major R. Cox.
Serjeant-Major A. T. Hasler.
Serjeant-Major T. E. Coggon.
Serjeant-Major H. J. Anderson.
Serjeant-Major E. R. Loft.
Serjeant-Major R. J. Mackay.

Royal Army Medical Corps Special Reserve.

Captain J. F. Murphy, M.B.

TERRITORIAL FORCE.

Royal Army Medical Corps.

1s *East Lancashire Field Ambulance.*—Leonard Emilius Harman Ross Barker, M.B., to be Lieutenant, dated December 11, 1914; Lieutenant Stanley Hodgson, M.D., from attached to unit other than Medical Units, to be Lieutenant, dated January 17, 1915.

2nd *East Lancashire Field Ambulance.*—George Robert Hitchen, M.B., to be

Lieutenant, dated November 22, 1914; William Joshua Cowan to be Lieutenant, dated November 26, 1914; John James Hummel, M.B., to be Lieutenant, dated December 20, 1914. Captain Farquhar Gracie, M.B., to be Major (temporary), dated November 30, 1914; Major James Bruce, M.B., to be Lieutenant-Colonel (temporary), dated December 1, 1914; Captain Robert Y. Anderson, M.B., to be Major (temporary), dated December 1, 1914.

3rd East Lancashire Field Ambulance.—James Alexander Tomb, M.B., to be Lieutenant, dated December 1, 1914; James Cowan to be Lieutenant, dated December 3, 1914; Quartermaster and Honorary Lieutenant James H. Bounds, from the 2nd East Lancashire Field Ambulance, to be Quartermaster, with the honorary rank of Lieutenant, dated January 19, 1915.

East Lancashire Casualty Clearing Station.—Lieutenant Thomas B. Wolstenholme, M.B., to be Captain (temporary), dated January 6, 1915.

West Lancashire Casualty Clearing Station.—Captain George C. E. Simpson, M.B., F.R.C.S., from 2nd West Lancashire Field Ambulance, to be Captain, dated January 5, 1915; Lieutenant William N. W. West-Watson, M.D., from 3rd West Riding Field Ambulance, to be Lieutenant, dated January 24, 1915.

West Riding Casualty Clearing Station.—David Rutherford Cramb, M.B., to be Lieutenant, dated October 23, 1914; Lieutenant-Colonel William McGregor Young, M.D., from the 2nd West Riding Field Ambulance, to be Lieutenant-Colonel, dated December 25, 1914.

1st West Riding Field Ambulance.—Henry Whitteron Robinson, M.B., to be Lieutenant, dated December 22, 1914; Edwin Samuel George Fowler to be Lieutenant, dated December 25, 1914; Captain James Ewing resigns his commission, dated January 5, 1915.

2nd West Riding Field Ambulance.—William Herbert Smailes, M.D., to be Lieutenant, dated December 28, 1914; Digby Wrangham Hardy, M.B., to be Lieutenant, dated December 29, 1914; Hartas Foxton, M.B., to be Lieutenant, dated January 1, 1915.

3rd West Riding Field Ambulance.—William Thomas Dakin Mart to be Lieutenant, dated December 11, 1914; Herbert Harry Emmerson (late Captain, West Riding Divisional Engineers) to be Captain, dated January 5, 1915; Lieutenant Ernest White, from attached to units other than Medical Units, to be Lieutenant, dated January 28, 1915.

1st Home Counties Field Ambulance.—Milward Cecil Hayward to be Lieutenant, dated December 3, 1914; Henry Wood Wier (late Cadet, Edinburgh University Contingent, Senior Division, Officers Training Corps) to be Lieutenant, dated December 10, 1914; John Samuel Ward to be Lieutenant, dated December 12, 1914; Captain Thomas H. Peyton, M.D., to be Major (temporary), dated January 5, 1915.

2nd Home Counties Field Ambulance.—Captain George T. Willan to be Major (temporary), dated January 5, 1915.

3rd Home Counties Field Ambulance.—Edgar William Matthews, M.B., to be Lieutenant, dated December 12, 1914; Henry John Brownrigg, M.D., to be Lieutenant, dated December 21, 1914; Philip Theodosius Jones to be Lieutenant, dated December 29, 1914; Transport Officer and Honorary Lieutenant John L. Hamilton, from 2nd Home Counties Field Ambulance, to be Transport Officer, with the honorary rank of Lieutenant, dated December 30, 1914; Captain Hector G. G. Mackenzie, M.D., to be Major (temporary), dated January 5, 1915; James Keogh, to be Quartermaster, with the honorary rank of Lieutenant, dated January 9, 1915.

1st Western General Hospital.—Ernest Edward Glynn, M.D., to be Captain, whose services will be available on mobilization, dated January 3, 1915.

2nd Western General Hospital.—William Lyon Stubbs to be Quartermaster, with the honorary rank of Lieutenant, dated December 17, 1914.

1st Northern General Hospital.—Major Frederick C. Pybus, M.B., F.R.C.S., from the permanent personnel to the List of Officers whose services will be available on mobilization, dated December 30, 1914; Captain Daniel W. Patterson, M.B., from the List of Officers whose services will be available on mobilization to the permanent personnel, dated December 30, 1914.

2nd Northern General Hospital.—Alfred Richardson, M.B., F.R.C.S., to be Captain, whose services will be available on mobilization, dated January 3, 1915.

3rd Northern General Hospital.—The undermentioned to be Lieutenants, dated December 28, 1914: Arthur Robertson Wightman, M.B., George Ewart Martin, M.B.

4th Northern General Hospital.—Basil Hugh Campbell Lea-Wilson, to be Captain, whose services will be available on mobilization, dated December 15, 1914; George

Samuel Levis to be Captain, whose services will be available on mobilization, dated December 26, 1914; Plomer William Young to be Captain, whose services will be available on mobilization, January 1, 1915.

2nd Eastern General Hospital.—The date of promotion to Captain of Lieutenant Hugh M. Galt, M.B., is September 17, 1914, and not as stated in the *London Gazette* of October 20, 1914. The undermentioned Captains to be Majors (temporary), dated November 24, 1914: Richard Whittington, M.D., William H. Brailey, M.D.

2nd Highland Field Ambulance.—Captain James Forbes MacIntosh, M.B., to be Major (temporary), dated December 26, 1914; Lieutenant James A. Stephen, M.B., to be Captain (temporary), dated December 26, 1914; Thomas Stewart Slessor, M.B., to be Lieutenant, dated January 24, 1915.

1st Scottish General Hospital.—Officer whose services will be available on mobilization, Captain John R. Levack, M.B., to be Major (temporary), dated November 1, 1914.

3rd Scottish General Hospital.—Captain Alexander J. Archibald, M.B., from the 4th Scottish General Hospital, to be Captain, dated November 21, 1914.

Scottish Horse Mounted Brigade Field Ambulance.—John Eaton Lascelles to be Lieutenant, dated December 10, 1914.

Sanitary Service.—Lieutenant-Colonel and Honorary Surgeon-Colonel William Robert Smith, M.D., retired list, Territorial Force, to be Lieutenant-Colonel (temporary), dated December 4, 1914; the surname of Lieutenant-Colonel Archibald K. Chalmers, M.D., is as now stated, and not as announced in the *London Gazette* of December 19, 1914; Albert Henry Bygott, M.B., to be Captain, whose services will be available on mobilization, dated January 17, 1915; Thomas Hamilton Ward, M.D. (late Lieutenant, Royal Army Medical Corps, Territorial Force), to be Captain, whose services will be available on mobilization, dated January 21, 1915.

1st South-Western Mounted Brigade Field Ambulance.—The date of appointment of Lieutenant Philip W. Mason, M.B., is October 3, 1914, and not as stated in the *London Gazette*, December 4, 1914.

2nd South-Western Mounted Brigade Field Ambulance.—The undermentioned to be Lieutenants: Philip Stanley Martin, dated September 28, 1914; Joseph Grant-Johnston, dated December 24, 1914. Captain Henry N. Barnett, F.R.C.S.Edin., to be Major (temporary), dated January 5, 1915; Major John R. Benson, F.R.C.S., to be Lieutenant-Colonel (temporary), dated January 30, 1915.

South Wales Mounted Brigade Field Ambulance.—William Frank Lloyd to be Transport Officer, with the honorary rank of Lieutenant, dated December 1, 1914; John Ambrose Cooke to be Lieutenant, dated December 26, 1914.

Welsh Border Mounted Brigade Field Ambulance.—Lieutenant Robert F. Gerrard to be Captain (temporary), dated December 2, 1914; Lieutenant Devonshire P. H. Gardiner, M.B., from attached to units other than Medical Units, to be Captain (temporary), dated December 7, 1914; Walter Stuart Snell to be Lieutenant, dated December 15, 1914.

1st Welsh Field Ambulance.—Edward Blyth Hurst Hughes to be Lieutenant, dated December 16, 1914.

2nd Welsh Field Ambulance.—John Hargreaves Robinson to be Lieutenant, dated December 1, 1914; Ernest Arthur Sheen to be Quartermaster, with the honorary rank of Lieutenant, dated December 22, 1914; Quartermaster-Serjeant Frederick Howard Green to be Transport Officer, with the honorary rank of Lieutenant (temporary), dated January 28, 1915.

1st Wessex Field Ambulance.—Frederick Charles Strike (late Acting Serjeant-Major) to be Quartermaster, with the honorary rank of Lieutenant, dated November 8, 1914; Captain Francis D. Blandy, M.D., from attached to units other than Medical Units, to be Captain, dated January 6, 1915; Walter Fitzpatrick (late Captain, Royal Army Medical Corps, Territorial Force) to be Captain (temporary), dated January 23, 1915.

1st West Lancashire Field Ambulance.—Frederick Ryan, M.B., to be Lieutenant, dated December 14, 1914; Serjeant James Norman Parks Holt to be Transport Officer, with the honorary rank of Lieutenant, dated January 8, 1915; Serjeant Arthur Pinnington to be Quartermaster, with the honorary rank of Lieutenant, dated January 8, 1915.

2nd West Lancashire Field Ambulance.—The undermentioned to be Lieutenant: James Herbert Rawlinson, M.B., dated September 21, 1914. The announcement of the appointment as Lieutenant of Edward Mansfield, which appeared in the *London Gazette* of December 30, 1914, is cancelled. The undermentioned to be Lieutenants, dated January 1, 1915: Herbert Ellis Marsden, M.B.; Joseph Henry Mather; Corporal Clive Whately Robinson, from the Western Signal Companies (Army Troops), Royal

Engineers, to be Transport Officer, with the honorary rank of Lieutenant, dated January 3, 1915. Captain Owen H. Williams, M.B., to be seconded, dated January 5, 1915.

3rd West Lancashire Field Ambulance.—The undermentioned to be Lieutenants, dated December 15, 1914: Gilbert William Rogers, M.B.; Sandys Jackson Charlesworth Holden, M.B. Staff-Serjeant James Shepherd to be Quartermaster, with the honorary rank of Lieutenant, dated December 31, 1914.

Lowland Mounted Brigade Field Ambulance.—Edward Napier Thomson, M.B. (late Cadet, Glasgow University Contingent, Senior Division, Officers Training Corps), to be Lieutenant, dated December 11, 1914.

1st Lowland Field Ambulance.—Lieutenant Neil MacInnes, M.B., to be Captain (temporary), dated December 19, 1914.

Notts and Derby Mounted Brigade Field Ambulance.—Lewis Moysey, M.B., to be Lieutenant, dated October 22, 1914; William Adam Brechin, M.B. (late Cadet Lance-Corporal, Glasgow University Contingent, Senior Division, Officers Training Corps), to be Lieutenant, dated December 5, 1914; Frank Standish to be Lieutenant, dated December 22, 1914.

1st Northumbrian Field Ambulance.—The undermentioned Lieutenants to be Captains (temporary), dated December 21, 1914; Edward B. Kitching, Joseph W. Craven, M.B.

2nd Northumbrian Field Ambulance.—The undermentioned to be Lieutenants, dated December 15, 1914: Thomas William Crowley, M.D.; Arthur Edwin Tait, M.B.; William Craig Stewart, M.B., F.R.C.S. (Edin.), to be Lieutenant, dated December 22, 1914; Charles Wilkinson Braithwaite to be Quartermaster, with the honorary rank of Lieutenant, dated December 30, 1914.

Northumbrian Casualty Clearing Station.—Charles Herbert Hicks to be Quartermaster with the honorary rank of Lieutenant, dated November 12, 1914.

2nd South Midland Field Ambulance.—Edmund Stanley Bowd to be Quartermaster, with the honorary rank of Lieutenant, dated October 19, 1914.

2nd South Midland Mounted Brigade Field Ambulance.—Henry George Magrath to be Captain, dated November 30, 1914; Edwin Jephson Widdowson to be Transport Officer, with the honorary rank of Lieutenant, dated December 8, 1914.

South Midland Casualty Clearing Station.—The undermentioned to be Lieutenant: Laurence Ball, M.B., dated November 22, 1914.

North Midland Mounted Brigade Field Ambulance.—The date of appointment of Lieutenant Lionel A. Dingley is August 19, 1914, and not as stated in the *London Gazette* of September 4, 1914.

North Midland Casualty Clearing Station.—William Frederick Earl Seymour to be Quartermaster, with the honorary rank of Lieutenant, dated November 27, 1914.

2nd North Midland Field Ambulance.—The undermentioned Lieutenants to be Captains (temporary), dated December 5, 1914: Claude M. Cowper, Alfred C. F. Turner, M.B. Lieutenant Horace Guy L. Haynes from attached to Units other than Medical Units to be Lieutenant, dated January 16, 1915.

3rd London General Hospital.—Major Arthur E. J. Barker, F.R.C.S., is seconded, dated November 12, 1914; Stanley Herbert Warren to be Captain, whose services will be available on mobilization, dated November 23, 1914; John Bromley Rawlins to be Lieutenant, dated November 30, 1914; Cecil Rhodes Harrison, M.B., to be Lieutenant, dated December 1, 1914.

4th London General Hospital.—Robert Knox, M.D., to be Captain, whose services will be available on mobilization, dated November 13, 1914; David Ernest Stephens Davies to be Lieutenant, dated November 13, 1914; Charles Eric Wells McDonald to be Lieutenant, dated December 22, 1914; the date of appointment of Captain Robert Knox, M.D., is August 15, 1914, and not as stated in the *London Gazette* of December 30, 1914.

2nd London Casualty Clearing Station.—George Herbert Hunt, M.B., to be Captain, dated November 27, 1914; Lionel Colledge, M.B., F.R.C.S., to be Captain, dated December 1, 1914.

London Mounted Brigade Field Ambulance.—The date of appointment of Lieutenant Herbert E. Roaf is September 2, 1914, and not as stated in the *London Gazette* of September 18, 1914.

3rd Southern General Hospital.—James Frederick Robinson, F.R.C.S., to be Captain, whose services will be available on mobilization, dated December 30, 1914; Lieutenant-Colonel Horatio P. Symonds, F.R.C.S.Edin., resigns his commission on account of ill-health, dated January 21, 1915; Major Arthur P. Dodds-Parker,

M.B., F.R.C.S., to be Lieutenant-Colonel (temporary), dated January 21, 1915; Captain Robert Ritson to be Major (temporary), dated January 21, 1915.

2nd East Anglian.—Laurence Henry Hutchins to be Lieutenant, dated November 14, 1914.

2nd East Anglian Field Ambulance.—Archibald Bruce Pettigrew to be Lieutenant, dated December 14, 1914; Arthur William Hayward to be Lieutenant, dated January 1, 1915; Captain William J. Caie, M.B., to be Major (temporary), dated January 10, 1915.

3rd East Anglian Field Ambulance.—Sigismund Henry Rentzsch to be Lieutenant, dated December 24, 1914; Edward Coomber Hobbs to be Lieutenant, dated December 2, 1914; Lieutenant Leonard R. Toswill to be Captain (temporary), dated January 6, 1915; Lieutenant William Brender, M.D., is seconded, dated January 9, 1915; Captain William I. Cowell resigns his commission on account of ill-health, dated January 15, 1915.

1st London (City of London) Sanitary Company.—Lieutenant Cresacre G. Moor to be Captain (temporary), dated October 1, 1914; Captain Heaver S. Fremlin to be Major (temporary), dated October 2, 1914; Robert Robinson to be Lieutenant, dated January 4, 1915; Lieutenant Charles J. D. Gair is seconded, dated January 7, 1915; Acting Serjeant-Major Charles Norman Draycott to be Lieutenant, dated January 17, 1915; William Dyer Frazer (late Surgeon-Captain, Rand Rifles) to be Lieutenant, dated January 28, 1915.

1st London (City of London) General Hospital.—Charles Ernest West, F.R.C.S., to be Captain, whose services will be available on mobilization, dated December 26, 1914.

2nd London Sanitary Company.—Captain Arthur J. Martin, M.D., to be Major (temporary), dated September 26, 1914; Kenneth MacLennan to be Lieutenant, dated December 11, 1914; John Henry Noel Price to be Lieutenant, dated December 11, 1914. The undermentioned to be Lieutenants: Patrick Albert Galpin, M.D., dated December 17, 1914; George Gordon Johnstone, M.B., dated December 29, 1914; George Leslie Eastes, dated January 8, 1915; Gerald Quin Lennane, F.R.C.S.I., dated January 10, 1915: George William Ellis, dated December 3, 1914; Walter Key Parbury, dated January 1, 1915; John Hutchinson Wood, dated January 1, 1915; Ernest Brooke Pike, dated January 2, 1915.

3rd London (City of London) Field Ambulance.—Leonard Henry Wootton, M.B., to be Lieutenant, dated December 10, 1914; Arthur Edward Huxtable to be Lieutenant, dated December 10, 1914.

5th London Field Ambulance.—Captain William C. Macaulay, M.B., to be Major (temporary), dated September 13, 1914.

6th London Field Ambulance.—The date of appointment of Lieutenant William Scarisbrick, M.B., is September 23, 1914, and not as stated in the *London Gazette* of October 26, 1914.

Archibald Nathaniel Shirley Carmichael, M.B., to be Lieutenant, dated October 27, 1914.

The date of appointment of Captain Henry W. Laing, M.D., is October 5, 1914, and not as stated in the *London Gazette* of October 23, 1914.

Attached to Units other than Medical Units.

Angus Cameron, M.B., to be Lieutenant, dated October 12, 1914.

Leslie Edward Hughes to be Lieutenant, dated December 13, 1914.

Lieutenant George C. Jeaffreson to be Captain (temporary), dated May 7, 1914.

Captain Matthew B. Ray, M.D., to be Major (temporary), dated August 5, 1914.

Captain Robert Thornton, M.B., to be Major (temporary), dated October 23, 1914.

Tom Ramsden Kenworthy (late Cadet Corporal, Leeds University Contingent, Senior Division, Officers Training Corps) to be Lieutenant, dated October 25, 1914.

Charles Adolphus Sampson to be Lieutenant, dated November 15, 1914.

Lieutenant Arthur Scott Turner to be Captain, dated November 16, 1914.

George Eustace, M.D., to be Lieutenant, dated November 18, 1914.

Captain Thomas Beard to be Major (temporary), dated December 6, 1914.

Joseph Patrick Fagan to be Lieutenant, dated December 11, 1914.

Henry William Case, M.B., to be Lieutenant, dated December 10, 1914.

Lancelot William Sparrow, M.B., to be Lieutenant, dated December 11, 1914.

The date of appointment of Lieutenant Frederic E. France, M.B., is October 27, 1914, and not as stated in the *London Gazette* of December 18, 1914.

John Herbert Jordan to be Lieutenant, dated December 9, 1914.

Samuel Rutherford, M.B., to be Lieutenant, dated December 10, 1914.
Robert Lyall Guthrie, M.D., to be Lieutenant, dated December 14, 1914.
Harold Francis Lewis Hugo, M.B., to be Lieutenant, dated December 19, 1914.
Thomas Richard Webster Atkins to be Lieutenant, dated December 20, 1914.
John Wilson Moir Jamieson, M.B., to be Lieutenant, dated December 21, 1914.
James Hornidge Chauncy to be Lieutenant, dated December 21, 1914.
Henry Charles Coutts Hackney to be Lieutenant, dated December 17, 1914.

Captain William E. Rielly, M.B., from 2nd London Field Ambulance, to be Captain, dated December 26, 1914.

Lieutenant James P. N. Casey, from 1st London Field Ambulance, to be Lieutenant, dated December 26, 1914.

Thomas Rhind to be Lieutenant, dated December 28, 1914.
Hugh Douglas McCrossan, M.B., to be Lieutenant, dated December 30, 1914.
Lieutenant Richard V. Favell to be Captain (temporary), dated December 31, 1914

Surgeon-Captain Thomas Duncan Greenlees, M.D. (late Grahamstown (South Africa) 1st City Volunteers), to be Major (temporary), dated January 2, 1915.

Evan David Richards to be Lieutenant, dated January 2, 1915.

Frank Greenhalgh Prestwich (late Second Lieutenant 7th Battalion, the Lancashire Fusiliers) to be Lieutenant, dated January 3, 1915.

Captain William G. Sutcliffe, F.R.C.S., to be Major (temporary), dated January 5, 1915.

Frederick Hunton, M.D., to be Lieutenant, dated January 5, 1915.
Captain James M. Kirkness, M.B., is seconded, dated January 7, 1915.

Lieutenant Maurice H. Barton, from the 2nd North Midland Field Ambulance, to be Lieutenant, dated January 10, 1915.

William Neville Pennant Williams to be Lieutenant, dated January 13, 1915.

The date of seconding Lieutenant Cecil W. Rowntree, M.B., F.R.C.S., is November 27, 1914, and not as stated in the *London Gazette* of January 14, 1915.

Lieutenant Cecil W. Rowntree, M.B., F.R.C.S., is seconded, dated January 15, 1915.

Captain Vincent Howard to be Major (temporary), dated January 17, 1915.

Major Alexander Leitch, M.B., resigns his commission on account of ill-health, and is granted permission to retain his rank and to wear the prescribed uniform, dated January 21, 1915.

Lieutenant Patrick Black resigns his commission, dated January 28, 1915.
Captain Lawrence C. V. Hardwicke, M.B., is seconded, dated January 30, 1915.
Lieutenant Charles S. Wink to be Captain (temporary), dated August 5, 1914.
Harold Burnet Porteous, M.B., to be Lieutenant, dated October 2, 1914.
Bertram Michell Young to be Lieutenant, dated October 16, 1914.
Edward Mansfield to be Lieutenant, dated September 30, 1914.

Surgeon-Captain Ernest Solly, M.B., F.R.C.S., Retired List (late 5th Battalion, The Prince of Wales's Own [West Yorkshire Regiment]) to be Captain, dated November 20, 1914.

George Charles King, to be Lieutenant, dated November 30, 1914.
Norman Preston Laing, M.B., to be Lieutenant, dated December 1, 1914.
Leonard Sadgrove Gaskell, M.B., to be Lieutenant, dated December 1, 1914.
Ralph Austin Burditt to be Lieutenant, dated December 3, 1914.
Percy Herbert Burton to be Lieutenant, dated December 15, 1914.
Captain George P. Chappel, M.D., to be Major (temporary), dated January 6, 1915.
Gerald Alfred Child, to be Lieutenant, dated January 5, 1915.
Lieutenant John B. Bate, M.D., to be Captain (temporary), dated January 17, 1915.
Hugh Gilbert Bruce, M.B., to be Lieutenant, dated January 24, 1915.

Spencer Robert Humby to be Second Lieutenant for service with the King's School (Worcester) Contingent, Junior Division, Officers Training Corps, dated January 12, 1915,

David William Rees (late Captain, Northern Bengal Mounted Rifles) to be Captain, dated December 1, 1914.

Private Edgar Golding to be Transport Officer, with the honorary rank of Lieutenant, dated December 31, 1914.

ROYAL ARMY MEDICAL CORPS FUND.

PROCEEDINGS OF A COMMITTEE MEETING HELD AT THE WAR OFFICE ON THURSDAY, JANUARY 21, 1915, AT 3 P.M.

Surgeon-General H. W. Russell in the chair.
Colonel Sir James Clark, C.B., Bart.
Colonel A. Peterkin.
Colonel E. Butt.
Major W. R. Blackwell.
Captain W. Benson.

(1) The minutes of the last meeting were read and confirmed.

(2) The grants received from companies for the General Relief Fund during 1914 were noted, and a list is appended to these Proceedings. Colonel Sir James Clark drew attention to the fact that some districts which subscribed least received the largest amounts in grants from the Fund for their destitute. The Secretary was desired to send reminders frequently to officers commanding districts with a view of increasing the income of the Fund.

(3) The grants made to companies from the General Relief Fund for the past half-year were considered and approved, and a list of recipients is attached hereto.

(4) The following position which has been adopted since the War commenced, for the distribution of relief, was considered, approved and adopted by the Committee. All cases of distress in the Corps attributable to the War should be referred to the local committees of the Soldiers' and Sailors' Families Association, and the General Relief Fund should be utilized, for the present, solely for cases of distress in the Corps unconnected with the War or which are ineligible for assistance elsewhere.

(5) It was noted that a sum of £42 has been received for the General Relief Fund from the Glasgow Town and Country Medical Club; and this money is to be specially earmarked for cases of distress caused by the War.

(6) The question of continuing assistance from the General Relief Fund to girl Hilda McDonnell after she attains the age of 16 was considered; the Secretary was instructed to find out her prospects of ever becoming a successful pupil teacher and is to act on the report.

(7) On the proposal of Sir James Clark, seconded by Colonel Peterkin, it was decided to continue to pay the Bandmaster's salary of £10 a month for the present, the subject to be again considered at the next meeting. Approval was also given for the payment of 1s. a day to Serjeant Smith for looking after the band instruments.

COMFORTS REPORT.

(8) As several ladies of the Corps at the beginning of the War were advertising for comforts for the R.A.M.C. at the front, Surgeon-General Sir Arthur Sloggett thought it would be best to have a Central Committee of ladies in London to collect and distribute the comforts to all the units at the front.

A Committee was formed of the wives of the Surgeon-Generals on the active list residing in or near London, with Lady Sloggett as President.

Sir Arthur Sloggett asked Lieutenant-Colonel Harris to assist in organizing the scheme: he therefore arranged for the Committee to have the use of a room at the College for receiving and packing the goods, he also advanced money from the R.A.M.C. Fund to cover the initial expenses of the Committee, such as advertising, etc.; this money has since been refunded by the Comfort Committee.

The Comfort Committee has received about £550 in money and a large quantity of comforts in kind; over 200 packages have already been despatched to units at the front.

(9) The accounts for 1914 were considered and passed, and are attached to these proceedings.

(10) It was decided to defer further discussion on the publication of Colonel Johnston's book until such time as the Committee shall hear from the executors.

(11) The question of a subscription to the Army Athletic Association was postponed.

(12) The casting of the votes by the Secretary at the last election of candidates for the Royal School for Officers' Daughters was approved.

F. W. H. DAVIE HARRIS, *Lieutenant-Colonel, Secretary.*

124, *Victoria Street, S.W.*
January 21, 1915.

ROYAL ARMY MEDICAL CORPS FUND.

LIST OF RECIPIENTS OF GENERAL RELIEF FOR THE HALF-YEAR ENDING DECEMBER 31, 1914.

Name	Age	District	Grant	Total	Remarks
Mrs. A. T.	57	Dublin	£2	£2	Husband ill in hospital.
Mr. A. C. W.	32	Aldershot	4	4	Destitution.
Mrs. A. C.		London	3½	3½	Two children dead at home.
Mr. J. L.	38	Cork	4	4	To assist in placing a child in a school.
H. McD.	15	Portsmouth	4	16	Sanctioned by Committee.
Mr. R. D.	45	London	1	3	Suffers from tubercle.

GRANTS RECEIVED FROM COMPANIES FOR THE GENERAL RELIEF FUND DURING 1914.

	£	s.	d.
Aldershot	80	0	0
Netley	5	0	0
Devonport	5	0	0
Chatham	1	0	0
Woolwich	2	10	0
Curragh	3	2	0
London (Rochester Row)	1	0	0
Wynberg (Serjeants' Mess)	12	12	0
Pretoria (Potchefstroom)	5	0	0
Bermuda	2	2	0
Hong Kong, £2 (Serjeants' Mess, £2)	4	0	0
Cairo	33	16	0
London (Grosvenor Road)	5	0	0
Bloemfontein	78	10	0
Officers and Detachment, Sierra Leone	5	0	0
	£243	12	0

GENERAL RELIEF GRANTS TO COMPANIES DURING THE YEAR 1914.

	£	s.	d.
London District	16	0	0
Aldershot District	16	0	0
Woolwich District	14	0	0
Cork District	4	0	0
Dublin District	9	0	0
York District	7	0	0
Colchester District	7	0	0
Portsmouth District	12	0	0
Tidworth District	4	0	0
Chester District	4	0	0
Dover District	3	0	0
Malta District	4	0	0
Gibraltar District	4	0	0
	£104	0	0

ROYAL ARMY MEDICAL CORPS OFFICERS' BENEVOLENT SOCIETY.

PROCEEDINGS OF A COMMITTEE MEETING HELD AT THE WAR OFFICE (ROOM 441), ON THURSDAY, JANUARY 21, 1915, AT 3.30 P.M.

Surgeon-General M. W. Russell, for President, in the chair. Surgeon-General W. Donovan, C.B., Colonel Sir James Clark, C.B., Bart., Colonel A. Peterkin.

(1) The Minutes of the last meeting were read and confirmed.

(2) A special grant of £5 given by the Secretary to Mrs. Elkington for an orphan was sanctioned, *vide* Rule 34.

(3) The accounts for 1914 were considered and approved and are attached hereto.

(4) The Report of the Committee for 1914 was considered and adopted, and is appended to these proceedings.

(5) It was noted that in accordance with the instructions of the Committee, at their meeting in July last, £150 Consols have been purchased at 75$\frac{1}{16}$ costing, with expenses, £133 15s. 5d.

REPORT OF THE COMMITTEE FOR THE YEAR 1914.

The number of subscribers for the year was 175.

The total receipts amounted to £890 7s. 6d., of which £186 19s. 6d. was received from subscriptions.

The total expenditure was £960 16s. 9d., which included the purchase of £150 Consols.

Twenty-eight applicants, representing forty-three orphans, were granted £749 18s. 6d., in grants varying in amount up to £40.

STATEMENT OF ACCOUNTS OF THE GENERAL RELIEF FUND FOR THE YEAR 1914.

Receipts.		£ s. d.
Balance in hand, December 31, 1913—		
Current Account	£639 13 6	
Deposit Account	400 0 0	
		1,039 13 6
Grant from R.A.M.C. Fund		80 0 0
,, ,, Companies		243 12 0
Subscriptions		2 0 0
Donations, Mr. C. E. Wright		4 4 0
Mr. Kay, for child's schooling		9 0 0
Rebate of Income Tax		2 15 10
W. Lancashire Field Ambulance		1 1 6
Dividends—		
Canadian Stock		19 17 8
East India Railway		30 4 2
Interest on Deposit Account		9 16 0
Town and Country Medical Club, Glasgow		42 0 0
		£1,484 4 8

Expenditure.		£ s. d.
Grants to Companies		104 0 0
Union Jack Club		25 4 0
Soldiers' and Sailors' Help Association		5 0 0
National Association for ex-Soldiers		5 0 0
Corps of Commissionaires		10 0 0
A. and N. Male Nurses Co-op.		5 0 0
Employment Branch, Aldershot		4 4 9
Royal Soldiers' Daughters' Home		19 0 0
U.S. Employment Association, Liverpool		2 2 0
Bankers' Charges		0 2 8
Purchase, £560 East India Railway Deb. Stock $3\frac{1}{2}$ % at $87\frac{3}{4}$		494 0 6
Balance in Bank, December 31, 1914—		
Current Account	£410 10 9	
Deposit Account	400 0 0	
		810 10 9
		£1,484 4 8

General Relief Trust Investments—	£ s. d.
Canada $3\frac{1}{2}$ % Reg. Stock	606 6 8
East India Railway $3\frac{1}{2}$ % Deb. Stock	1,060 0 0
	£1,666 6 8

ROYAL ARMY MEDICAL CORPS FUND.

Statement of Accounts for 1914.

Receipts.		£ s. d.
Balance in hand, December 31, 1913—		
Current Account	£25 19 11	
Deposit Account	800 0 0	
		825 19 11
Subscriptions		1,139 4 6
Interest on Deposit Accounts		10 10 10
Dividends :—		
Caledonian Railway		45 10 1
North British Railway		54 16 4
Royalty on sale of Service Memoirs		0 18 3
		£2,076 19 11

Expenditure.		£ s. d.
Grant to Band		320 0 0
,, Dinner		315 8 4
,, General Relief Fund		80 0 0
Purchase of £397 Caledonian Railway 4% Con. Pref. Stock at 99½		399 3 4
Purchase of £422 North British Railway 4 % Pref. Stock, 1908, at 93¾		399 15 6
Banker's Charges		0 8 4
Memorials		10 18 0
Fund for Preservation of Battlefield of Waterloo		26 5 0
Royal School for Officers' Daughters		26 5 0
Fire Insurance Q.A.M.H. Chapel		4 5 6
Refund of Subscription		1 0 0
Shorthand writer		1 1 0
Secretary and Office		90 0 0
Stationery		2 12 5
Printing		0 14 9
Postage		2 9 9
Balance in Bank, December 31, 1914 :—		
Current Account	£196 13 0	
Deposit Account	200 0 0	
		396 13 0
		£2,076 19 11

Investments.

Caledonian Railway 4 % Preference Stock	£1,408 0 0
N. British Railway 4½ % Preference Stock	1,457 0 0
	£2,865 0 0

ROYAL ARMY MEDICAL CORPS OFFICERS' BENEVOLENT SOCIETY.

STATEMENT OF ACCOUNTS FOR 1914.

RECEIPTS.	£	s.	d.
To Balance in Bank, December 31, 1913	453	13	7
,, Subscriptions	186	19	6
,, Rebate of Income Tax	44	2	2
,, Dividends—			
North Eastern Railway, 3 % Debenture Stock (*less* tax £12 1s. 8d.)	187	17	10
London & North Western Railway, 3 % Debenture Stock (*less* tax £11 17s. 6d.)	188	2	8
Midland Railway, 2½ % Debenture Stock (*less* tax £9 13s. 4d)	150	6	8
Caledonian Railway, 4 % Debenture Stock (*less* tax £6 15s. 4d.)	104	8	8
Consols	28	10	2
	£1,344	1	3

EXPENDITURE.	£	s.	d.
By Grants	749	18	6
,, Auditors' Fees	1	1	0
,, Bankers' Charges	0	4	0
,, Verification of Consols	0	1	0
,, Secretarial and Office Expenses	90	0	0
,, Stationery	2	12	5
,, Printing	0	14	9
,, Postage	2	9	8
,, Purchase £150 Consols	113	15	5
,, Balance in Bank, December 31, 1914	383	4	6
	£1,344	1	3

INVESTMENTS.	£	s.	d.
London & North Western Railway, 3 % Debenture Stock	6,667	0	0
North Eastern Railway, 3 % Debenture Stock	6,666	0	0
Midland Railway, 2½ % Debenture Stock	6,400	0	0
Caledonian Railway, 4 % Debenture Stock	2,780	0	0
Consols	1,327	7	9
	£23,840	7	9

We have compared the above statement with the books and papers relating thereto, and certify that it is correct. We have verified the Bank Balance and the Investment in Consols, and have inspected the Certificate of the Investments in Railway Stocks as set out.

Portland House,
Basinghall Street, E.C.
January 7, 1915.

(*Signed*) EVANS, PEIRSON & CO.,
Chartered Accountants.

STATEMENT OF COMPASSIONATE SCHOOL FUND ACCOUNTS.

Receipts.		£ s. d.
Balance in hand, December 31, 1913—		
Current Account	£123 4 9	
Deposit Account	300 0 0	
		423 4 9
Interest on Deposit Account		7 6 5
		£430 11 2

Expenditure.		£ s. d.
Royal Soldiers' Daughters' Home		57 0 0
Drummond Institute		5 0 0
Home for Destitute Catholic Children..		12 0 0
Balance in Bank, December 31, 1914—		
Current Account	£56 11 2	
Deposit Account	300 0 0	
		356 11 2
		£430 11 2

BALANCE SHEET.

Statement of Accounts.

Assets.			£ s. d.
Balance per Pass Book, December 31, 1913 ..	£788 18 2		
Receipts for 1914	2,334 12 9		
		£3,123 10 11	
Expenditure for 1914, per Pass Book		2,442 6 0	
Balance in Bank, December 31, 1914			681 4 11
Deposits, R.A.M.C. Fund			200 0 0
,, General Relief Fund			400 0 0
,, School Fund			300 0 0
Investments, R.A.M.C. Fund			2,865 0 0
,, General Relief Trust Fund			1,666 6 8
			£6,112 11 7

Liabilities.	£ s. d.
To R.A.M.C. Fund	3,261 13 0
,, General Relief Fund	2,476 17 5
,, School Fund	356 11 2
Outstanding Cheques, December 31, 1914	17 10 0
	£6,112 11 7

124, *Victoria Street*,
London,
January 6, 1915.

Examined and found correct,
(*Signed*) EDWD. M. WILSON, *Lieut.-Colonel*, R.P.
O. R. A. JULIAN, *Lieut.-Colonel*, R.A.M.C.

OBITUARY.

COLONEL WILLIAM JOHNSTON, C.B.

COLONEL W. JOHNSTON died very suddenly on January 26, aged 71. He was born at 36, Bon-accord Terrace, Aberdeen, on April 16, 1843, being the son of Mr. Robert Johnston, merchant and shipowner, Aberdeen. Colonel Johnston belonged to a very well-known family in Aberdeenshire, and was heir-presumptive to the baronetcy of Johnston of Caskieben. He was educated at the Marischal College, Aberdeen, and graduated M.A. in 1863. His medical studies were completed at Edinburgh, and he received the M.D. in 1865, being commended for his thesis. Colonel Johnston entered the Service on October 2, 1865, as a Staff Assistant Surgeon. On October 19, 1872, he was appointed Assistant Surgeon to the 78th (Seaforth) Highlanders, and became Surgeon in the Army Medical Department on the abolition of the regimental medical system on March 1, 1873. He was promoted Surgeon-Major in October, 1877, Surgeon-Lieutenant-Colonel in October, 1885, and Brigade Surgeon Lieutenant-Colonel in January, 1892. He retired from the Army in August, 1892. Colonel Johnston was twice on active service in South Africa. During the operations against Sekukuni in the Transvaal in 1878 he served as Senior Medical Officer, and was present at the storming of Toyana's Stadt. In the Zulu War of 1879 he was Senior Medical Officer of the column under Colonel Rowland on the Swazie border; and was in charge of the field hospital with Colonel Baker Russell's force in the operations against Sekukuni in 1879. For these services he was mentioned in despatches, and received the medal and clasp. He also commanded a bearer company in the Boer Campaign of 1881. An interesting account of the work of this company, at that time quite a new unit, was written by Colonel Johnston, and published in the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, vol. xvii.

From 1882 to 1888 Colonel Johnston served in the War Office as Staff Officer of the Medical Staff Corps, and from 1888 to 1891 he commanded the depot and training school of the Medical Staff Corps at Aldershot. In both these appointments he displayed marked administrative ability: his personal charm and great enthusiasm for the Corps must be well remembered by many officers now serving, who had the privilege of commencing their military career under his regime. The affection and esprit de corps which he inspired will never be forgotten.

During the South African War, 1899-1902, Colonel Johnston was gazetted Assistant Director-General at the War Office, a unique distinction for an officer on retired pay, and in recognition of his services he was created a C.B. and promoted Colonel in 1902.

Colonel Johnston always took a great interest in the status of the Corps, and it was mainly through his indefatigable exertions that medical officers received substantive rank. On his retirement in 1892 he took up his residence in Newton Dee, Aberdeen, and devoted his leisure to literary work and to the charitable institutions of his native town.

Colonel Johnston was a most industrious and active worker and historical investigations had a great fascination for him. He compiled a number of valuable books on genealogical and bibliographical subjects, principally for private distribution. In 1908 the degree of LL.D. was conferred on him by the Aberdeen University in recognition of the services he had rendered to the University.

At the time of his death Colonel Johnston was engaged on a history of the Medical Service. He had access to all official records, and his task was nearing completion when his sudden death brought his labours to a close. It is hoped that this work will not be lost to the Service, and that a successor will be found to complete the book on which he had spent years of loving thought and labour.

BIRTH.

TURNBULL.—At Jubbulpore, C.P., India, on October 31, 1914, the wife of Captain J. A. Turnbull, R.A.M.C., of a daughter.

EXCHANGES, &c.

A free issue of twenty-five reprints will be made to contributors of Original Communications, and of twenty-five excerpts of Lectures, Travels, and Proceedings of the United Services Medical Society.

Any demand for excerpts, additional to the above, or for reprints, must be forwarded at the time of submission of the article for publication, and will be charged for at the following rates, and additional copies at proportionate rates:—

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		£ s. d.	£ s. d.	s. d.	s. d.	s. d.	s. d.
12	4	0 2 6	0 1 0	3 6	0 11	3 2	0 7
	8	0 4 6	0 2 0				
	16	0 7 6	0 3 6				
25	4	0 3 0	0 1 3	4 0	1 3	3 6	0 9
	8	0 5 6	0 2 6				
	16	0 9 6	0 4 6				
50	4	0 4 0	0 1 8	5 0	1 9	4 0	1 0
	8	0 6 9	0 3 2				
	16	0 12 0	0 5 3				
100	4	0 5 6	0 2 9	6 6	3 3	5 6	2 0
	8	0 9 0	0 4 4				
	16	0 16 9	0 6 9				
200	4	0 8 6	0 4 0	9 0	6 3	7 6	4 0
	8	0 13 6	0 6 0				
	16	1 3 6	0 8 9				

* These are not arranged as Reprints, but appear precisely as in the Journal with any other matter that may happen to appear on the first and last pages of the particular excerpt ordered.

CASES FOR BINDING VOLUMES.—Strong and useful cases for binding can be obtained from the publishers at the undermentioned rates:—

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In forwarding parts for binding the name and address of sender should be enclosed in parcel.

Notices.

EDITORIAL NOTICES.

The Editor will be glad to receive original communications upon professional subjects, travel, and personal experiences, etc. He will also be glad to receive items of news and information regarding matters of interest to the Corps from the various garrisons, districts, and commands at home and abroad.

Matter intended for the Corps News should reach the Editor not later than the 15th of each month for the following month's issue. Notices of Births, Marriages, and Deaths are inserted free of charge to subscribers and members of the Corps. All these communications should be written upon one side of the paper only; they should by preference be type-written, but, if not, all proper names should be written in capital letters (or printed) to avoid mistakes, and be addressed The Editor, "JOURNAL OF THE ROYAL ARMY MEDICAL CORPS," War Office, Whitehall, London, S.W.

Communications have been received from Colonel C. Birt, Colonel R. H. Firth, Captain A. E. B. Wood.

The following publications have been received:—

British: The Lancet, The Practitioner, The Hospital, The Royal Engineers' Journal, Medical Press and Circular, Medical Journal of Australia, Red Cross and Ambulance News, The Journal of State Medicine, Journal of the Royal Sanitary Institute, Guy's Hospital Gazette, Public Health, The Medical Journal of South Africa, The Quarterly Journal of Medicine, Tropical Veterinary Bulletin, St. Bartholomew's Hospital Journal, The Indian Journal of Medical Research, The Medical Review, The British Journal of Tuberculosis, The Indian Medical Journal, Report of the Bombay Bacteriological Laboratory, Bulletin of Entomological Research, The Journal of Tropical Medicine and Hygiene, The Indian Medical Gazette, The South African Institute for Medical Research, The Middlesex Hospital Journal, Journal of the Royal Naval Medical Service, Proceedings of the Royal Society of Medicine, Tropical Diseases Bulletin, The St. Thomas's Hospital Gazette, Annals of Tropical Medicine and Parasitology.

Foreign: Office of the Surgeon General, United States Army, Bulletin de l'Institut Pasteur, Annali di Medicina Navale e Coloniale, Zanzibar Public Health Report, Revista de Sanidád Militar, Giornale di Medicina Militare, The Military Surgeon, Tidskrift i Militär Hälsovard, Bulletin de la Société de Pathologie Exotique, Le Caducée, Bulletin of the Johns Hopkins Hospital, United States Public Health Service, Office International d'Hygiene Publique.

MANAGER'S NOTICES.

The JOURNAL OF THE ROYAL ARMY MEDICAL CORPS is published monthly, six months constituting one volume, a volume commencing on 1st July and 1st January of each year.

The Annual Subscription is £1 (which includes postage), and should commence either on 1st July or 1st January; but if a subscriber wishes to commence at any other month he may do so by paying for the odd months between 1st July and 1st January at the rate of 1s. 8d. (one shilling and eightpence) per copy. (All subscriptions are payable in advance.)

Single copies can be obtained at the rate of 2s. per copy.

The Corps News is also issued separately from the Journal, and can be subscribed for at the rate of 2s. (two shillings) per annum, including postage. Subscriptions should commence from 1st July each year; but if intending subscribers wish to commence from any other month, they may do so by paying for the odd months at the rate of 2d. per copy. (All subscriptions are payable in advance.)

Officers of the Royal Army Medical Corps possessing Diplomas in Public Health, etc., are kindly requested to register their special qualifications at the War Office. Letters of complaint are frequently received from officers stating that their special qualifications have not been shown in the Distribution List which is published as a supplement to the Journal in April and October of each year. As, however, the particulars of this list are supplied from official sources, officers are reminded that unless the possession of Diplomas, etc., has been registered at the War Office, no entry of such qualifications can be recorded in the Distribution List.

Letters notifying change of address should be sent to the Hon. Manager, "Journal of the Royal Army Medical Corps," War Office, Whitehall, London, S.W., and must reach there not later than the 20th of each month for the alteration to be made for the following month's issue.

It is requested that all Cheques or Postal Orders for Subscriptions to the Journal, Corps News, Reprints, &c., be crossed "Holt & Co.," and made payable to the "Hon. Manager, Journal R.A.M.C.," and not to any individual personally.

All communications for the Hon. Manager regarding subscriptions, etc., should be addressed to

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"JOURNAL OF THE ROYAL ARMY MEDICAL CORPS,"
WAR OFFICE, WHITEHALL, S.W.